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The Economic Record

Vol. XXXVI August, 1960 No. 75

THE AUSTRALIAN ECONOMY, JULY 1960

Introduction

In July 1960 the Australian economy is producing more, and expanding its production faster—in absolute if not in percentage terms—than at any earlier date.[1] Exports are in a very healthy condition. Despite increased imports, liquid reserves have been slowly rising (see Table 1). Capital has been flowing into the country at a very high rate. Unemployment has been falling. Public opinion, as evidenced by the booms in land values and in equity shares, anticipates even greater progress in the years ahead.

TABLE 1

Net Gold and Foreign Exchange Holdings—Official and Banking Institutions

(*£A million*)

End of June	Gold	Dollars	Sterling Securities	Other Foreign Exchange	Total
1957	51·7	26·7	43·8	444·3	566·5
1958	65·8	27·0	43·8	388·8	525·4
1959	60·2	32·1	34·7	389·4	516·4
first half of 1959-60	—	—	—	—	547·2

Source: The Annual Reports of the Commonwealth Bank of Australia.

One outstanding economic problem seems to remain, and it has been frequently discussed academically and in public debate: can the boom be sustained without a dangerous degree of inflation? Certain trends at the beginning of 1960 held "a threat of serious instability". Worst of these trends was "the price and cost movement. It had already become too fast . . . (and) was certain to become faster".[2] Despite the debates, the difficulty remains un-

1. The indices for production are not yet available, but there seems no reason to doubt that up to July 1960 output has increased at the same rate (in orders of magnitude) as in slightly earlier periods. From July 1959 to March 1960 factory output was up by 12·7%; agricultural output in June 1959 as compared with June 1958 was up by 58·7%. There have been periods no doubt of larger increases in agricultural output.

2. *The Australian Economy 1960*, p. 17.

resolved, both theoretically and practically. No one is quite sure how much damping down of the economy the Commonwealth Government and the Reserve Bank will have to do in order to maintain a desired stability, nor can anyone be sure that traditional measures will be effective. As has recently been pointed out,[3] the total advances of the major trading banks in Australia now amount to 18·5% of the national income as against 36% in 1938. According to Professor Arndt's calculations,[4] "bank credit accounted for 56% of all credit supplied by the main financial intermediaries" in the five years before the war, and "fell to 21% over the last five years" (1953-58).[5]

But even if the precise measures needed to restrain inflation were known, the possibility would have to be entertained that there were other objectives of the Australian economy than price stability. Growth and full employment are often rightly included among them. Because of these and similar considerations, a frontal attack on inflation is time and again postponed. After all, it can hardly be successfully claimed that any remedy for inflation is desirable. The cure may always be worse than the disease.

Inflation, although often given pre-eminence among Australia's short-term problems, is not necessarily going to occupy that position indefinitely. Other very pressing problems are how to secure and to develop market outlets for Australian exports, and how to ensure the continued provision of overseas capital to finance development; inflation may complicate these, but it is not by itself the only complicating factor. Even in the six months ahead, inflation should be viewed as one, but only one, of the dangers to the economy.

The first main task of this article is to examine the forces of inflation (Part I), and the second to examine the export prospects of the economy (Part II).

As for the outlook for the economy over the next twelve months, this depends partly upon policy decisions either not yet taken, or not yet publicly announced. If there is no change in credit or budgetary policy, it will be difficult to avoid progressive mild inflation, followed almost certainly by severe balance of payments difficulties in 1961; if a stiffening of those policies is soon adopted, however, the prospects for 1961 are much more favourable. In the conclusion (Part III) a summing-up of the reasons for a change in policy will have to be attempted.

3. In the National Bank's *Monthly Summary of Australian Conditions*, 16th March, 1960, p. 3.

4. *The Banks and the Capital Market*, a lecture delivered at the University of Queensland in 1959 and published in Brisbane, March 1960.

5. Professor Arndt includes in his "financial intermediaries" trading banks (advances), stock exchanges (new capital), hire purchase (debt increase), life assurances (increase in loans outstanding), savings banks and holdings securities (increase in housing loans), pastoral finance companies (advances). Life assurance and company finance also declined in relative importance. The big rises were in the proportion of all loan money raised through the stock exchange (18% to 76%), and through hire purchase finance (2% to 16%). The process has continued in 1959-60.

Part I. Inflation

The Amount of Inflation

The year 1959 saw the beginning of the present boom. Private capital expenditure rose sharply in the first half of the year, particularly on plant and equipment, and public authority expenditure rose considerably in the second half. The building boom in dwellings and in other buildings continued; commencements of buildings (other than dwellings) rose inexplicably fast in the last two quarters of 1959.[6] There is not much doubt that those movements have continued throughout the year 1959-60, and that fixed private investment will have been running some 15% above the level for the previous year.[7]

Table 2 shows how prices moved up to the end of 1959. Retail prices (interim index) advanced 2·6% during the calendar year, as against 2·8% in the year 1958.

TABLE 2

Prices and Wage Indexes (percentage changes)

	Retail Prices (a)	Wholesale Prices (b)	Import Prices	Export Prices (c)	Nominal Wage Rates	Average Weekly Earnings (d)
	Percentage change on same quarter of preceding year					
June 1958	+1·9	—5·8	+1·9	—25·6	+1·5	+2·1
June 1959	+2·6	—0·4	0	+6·2	+3·2	+2·6
December 1958	+2·8	—3·4	0	—16·6	+1·8	+7·0
December 1959	+2·6	+2·6	+0·3	+17·9	+6·5	+4·8
March 1958	+2·1	—2·4	+2·9	—19·0	+3·8	+5·7
March 1959	+2·5	—0·9	—0·7	—11·9	+2·1	+2·5
March 1960	+3·4	+3·5	n.a.	+16·0	n.a.	+8·9
	Percentage change cumulatively June 1959 base					
1959-60						
September	+0·6	+0·6	0	+4·4	+0·7	+3·3
December	+1·4	—0·3	+0·6	+5·5	+3·4	+3·9
March	+2·5	+0·9	n.a.	+3·8	n.a.	+7·8
Est. June						
1959-60	Percentage change on preceding quarter					
September	+0·6	+0·6	0	+4·4	+0·7	+3·3
December	+0·8	—0·9	+0·6	+1·0	+2·8	+0·7
March	+1·8	+1·6	n.a.	—1·6	n.a.	+3·7

(a) Interim price index excluding potatoes and onions.
(b) Index of basic materials.
(c) Excluding gold.
(d) Per adult male, seasonally adjusted.

Sources: C.B.C.S. *Monthly Review of Businesss Statistics.*
Peserve Bank of Australia *Statistical Bulletin.*

Nominal wage rates, however, rose during 1959 by no less than 6·5%, against the previous year's 1·8%. The question arose, by the end of 1959, how far this rise in wages was likely to precipitate a

6. See *The Australian Economy 1960,* pp. 13-14.
7. See Table 3 herein.

further round of inflation—or, indeed, how far it was a symptom of an inflation already taking place. Were we moving from a "creeping inflation" with a steady increase in prices of the order of magnitude of 2% to 3% per year to a more serious rise of the order of 6%?

Certainly the rate of increase in retail prices was bound to be speeded up. Mr. Boxer remarked, in last December's issue of *The Economic Record*, that retail prices during the current (financial) year would be unlikely to rise by less than 3%, and in this prediction he is being proved entirely correct. From June 1959 to March 1960 the index rose by 2·5% and by June it will no doubt have increased by something well over the 3% mark. In the first quarter of this (calendar) year (third of the fiscal), the rate of increase in the index noticeably accelerated. It moved up more than 1% in a single quarter.[8] There would indeed be an inflation if this acceleration continued, and if prices, echoing wages, began to advance by 6% per annum. An economy with a 5% to 6% per annum rise of prices would be suffering from something worse than creeping inflation.

The Australian price and wage increases have greatly exceeded those taking place in some other countries, especially the United Kingdom. There, wage rates by the end of March 1960 had risen only 1% since June 1959, while prices had risen about 0·5% over the same period.[9] Such increases in wages and earnings as were taking place were more than adequately covered by the general increase in labour productivity.

Is the Australian economy about to exhibit a somewhat accelerated inflation? Or will the rapid rates of increase of wages in 1959 be absorbed by the economy's improvement in productivity, and by the temporary alleviation of greater inflow of imports? Undoubtedly the statistics to the end of 1959 suggested that a round of cost-stimulated inflation was about to begin. It is sometimes, though perhaps not invariably, true that the forces of cost inflation, though conceptually different from those of demand inflation, are unlikely to become very noticeable unless both are working in the same direction. As Duesenberry has argued,[10] threats by the unions to strike, and to "raise hell generally", cannot drive wage rates up any faster, in the final analysis, than the employers are able to pay out. A high demand is often a necessary condition of noticeable cost-push effects emanating from wage-earners. To form some idea of the order of magnitude of the second round effects of the 1959 wage cost increases

8. Despite the weakness of this index as a measure of the *current* movement in prices generally (time lags are involved in interpreting the particular prices used in the index), in the absence of evidence to the contrary, these movements suggest a quickening in the rate of inflation.

9. See *Economic Trends*, No. 79, May 1960. In the United States the cost of living index had advanced by only two points and the German index by four points since the last quarter of 1958. (See *International Financial Statistics*, May 1960, Vol. XIII, No. 5.)

10. In an address to The American Assembly, Columbia University, published in *Wages, Prices, Profits and Productivity*, The American Assembly, Columbia University, June 1959.

it may be as well to construct tentatively some up-to-date national income estimates, and to examine the main factors of change.

The Possible Out-turn of the National Income 1959-60

At the time that this article is written (June 1960), estimating the figures for the major components of the National Income has to depend on published statistics for production, employment, retail trade and so forth, running up to March 1960 at the latest. At the time that the article is available to be read the official estimates, based on unpublished as well as published statistics, and in any case upon later returns, will be in print, or just about to appear in the 1959-60 National Income White Paper. The reader can indulge in the pleasure of seeing how wrong the guesses written down below have turned out to be. He will be in a position to use his superior information to practical effect, since the later figures will show in which directions the tentative conclusions drawn from the following rough estimates need to be modified.

TABLE 3

Total Market Expenditure
1957-8, 1958-9, and a preliminary estimate for 1959-60
(£ *millions*)

	1957-58	1958-59	1959-60 (Preliminary unofficial estimate)	Possible outcome in 1960-61 (if no change in policies)
1. Public authorities	1052	1131	(1235)	(1325)
2. Financial enterprise	60	64	(70)	(75)
Gross private investment				
3. Fixed	1025	1063	(1220)	(1350)
4. Stocks	28	78	(20)	(75)
5. Personal consumption	3773	(3955)	(4255)	(4550)
Total	5941	6291	(6800)	(7375)
6. Exports*	929	931	(1055)	(1050)
Total market expenditure	6870	7222	(7855)	(8425)

Source: First two columns: *National Income and Expenditure, 1958-59.*
*Excluding other net rent, interest, etc., and private remittances.

First, as to the basis of the estimates. Each line of the table for Total Market Expenditure (see Table 3) was estimated from monthly or quarterly returns giving series that have hitherto moved closely with the main components of the line in question. Thus, for example, since personal consumption moves closely, from year to year, with the index for retail sales (exclusive of motor vehicles, parts and

petrol),[11] the personal consumption figures of £3955 millions in 1958-59 were raised by 7½% to arrive at the estimate of £4255 millions for such consumption in 1959-60. The figure of 7½% was based on the fact that over the last three quarters to March 1960, retail sales had run at 5%, 6·5% and 8% above sales for the corresponding quarters of 1958-59, and 7½% seemed a reasonable estimate, allowing for the rising quarterly trend, of the rise for the full year. Similar calculations were made for public authorities' expenditure, and gross private investment in fixed capital. There was no direct evidence available on output of financial enterprises (as defined for national income purposes), or on changes in stocks; these had to be guessed, and there must be a high percentage of possible error in these items.[12] Unless all the series are out of step with national income estimates, the major items of lines 1, 3, 5 and 6 (exports) should each be not more than £50 millions in error, but any sudden movement in the period April to June 1960, or any adjustment to the figures on the grounds of information not made public, could increase the possible error.

Figures for the payments side of the table were arrived at by a similar exercise. Wages and salaries seemed likely to be up by 8%, farm income to run at not less than £460 millions, and company income not below (and possibly much above) £650 millions. Working back from the total of £7855 millions (given in Table 4), and deducting imports, depreciation and indirect taxes, the National Income seems likely to be something like £5380 millions.

While the smaller items in this second part of the table have large margins of error, the orders of magnitude for most of the larger items (lines 1, 2, 4, 6, 7 and 9) seem to be well established. A rise of earnings of some 7%, and of employment of 2½%, seems to be the least that can be anticipated (all comparisons are for 1959-60 over 1958-59). An 8% rise in wages and salaries seems to be conservative. Similarly, the estimate for farm income is, if incorrect, probably too low.

It may well be, it would seem, that the figure for National Income of £5380 millions is itself too low. If, however, this had to be raised by £100 or £150 millions, it is extremely difficult to select which items on the market expenditure side would be correspondingly increased. It may be that personal consumption is running higher than has been estimated (perhaps because the series for retail sales is not sufficiently representative to judge trends in total consumption). Alternatively, since the figure for public authorities' expenditure cannot be far from

11. As published in (among other places) the *Monthly Digest of Current Economic Statistics*. The figures used were from issue No. 9, April 1960, p. 7.

12. The figure for stocks, which is a total of the change in value of both farm and non-farm stocks, is particularly important, and particularly hard to guess. It is shown as only £20 millions, on the grounds that the net increase in the value of stocks will be low in a year when delivery dates for several important manufacturing items are believed to have lengthened, and when exportable farm surpluses have been readily cleared. If inflation proceeded for another year, and if imports continued to rise, the increase in the value of goods accounted for by firms as stocks, or work in progress, might rise.

TABLE 4

Total Market Supplies
1957-8, 1958-9, and a preliminary estimate for 1959-60
(*£ millions*)

	1957-58	1958-59	1959-60 (Preliminary unofficial estimate)	Possible outcome in 1960-61 (if no change in policies)
1. Wages and salaries	2919	3046	(3300)	(3500)
2. Company income	608	(630)	(650)	
3. Surplus of public authorities	57	70	(75)	(1240)
4. Farm income	335	408	(460)	
5. Other business income	528	545	(550)	(605)
6. Net rent and interest	288	322	(345)	(400)
7. National income	4735	5021	(5380)	(5740)
8. Indirect tax less subsidies	672	701	(750)	(830)
9. Depreciation	445	475	(500)	(530)
10. Imports, etc.*	1018	1025	(1225)	(1325)
Total Market Supplies	6870	7222	(7855)	(8425)

Source: First two columns: *National Income and Expenditure, 1958-59.*

*Excluding public authority overseas gifts, relief, etc., private remittances, public authority interest, net dividends, and remitted profits, net undistributed profits.

the final estimate, there must have been some underestimating for fixed capital investment, or of investment in stocks.

In general, if the total figures for incomes paid out are anywhere near as high as the trends in the main series seem to suggest, *some* forms of expenditure—probably some investment items—have risen even more steeply than our figures suggest. There may turn out to have been increases in the value of investment, partly due to the pressure of higher incomes on supplies, and a marking up of prices. Our figure for investment in stocks may be far too low.

There are certain broad facts which we know with some certainty about the financial year now drawing to its close. It has been a year of rising public expenditure, of even more steeply rising investment, and of some increase in the total of consumption. The important point is that (private) investment increased about two and a half times as fast as total consumption. Since prices rose by some 3% and population by 2% the rise in average real consumption per head must have been extremely moderate, not more than 2% or 2½%. (Motoring is excluded from consumption estimates.) Additional "investment" per head of population was very substantial.

Finally, in the last colums of each of Tables 3 and 4 are shown some of the principal items for the National Income in 1960-61, which would be realized if prices continued to rise (at an additional 4%), employment rose by 2%, and productivity by about 1%. In these circumstances, total market supplies would rise to some £8425 millions (plus or minus £100 millions), and it is plausible to argue that of this at least an extra £100 millions would come from imports. The question arises whether exports would increase correspondingly, and if, as suggested in the table, they remained somewhat static, an even larger amount of capital inflow will be needed in 1960-61 to cover the gap in overseas payments.

The purpose of including figures in the column for 1960-61 is merely to show the orders or magnitude, and the figures chosen are illustrative only of one possible outcome. So far as they go, they seem to indicate that if present trends continued unchecked the problem of the balance of payments next year might become especially grave.

The Reduction of Inflation

Remedies against the "inexorable progress" of inflation were adopted in the first half of 1960. Their object was to "prevent, as far as possible, new cost or price increases". One step taken was the Government's open intervention in the proceedings of the Conciliation and Arbitration Commission. This stopped a rise in the Federal Basic Wage. The other action was to be reduction by the Reserve Bank of excess liquidity in the banking system, the avoidance of deficit finance in the coming financial year, and financial measures (even before the Budget) aimed at reduction in the current deficit.

It is important to note that while there was direct Government action through intervention on wages, nothing was proposed or done to intervene directly on prices. These were to be affected, presumably, only indirectly, through the reduction of over-all demand. A final measure adopted was the official policy of allowing imports to increase even at the risk of some temporary running down of reserves. (First, however, as a safeguard liquidity was increased by new arrangements with the International Monetary Fund.)

The Consolidated Revenue Fund account was budgeted for the year 1959-60 to show an increase in expenditure of £97 millions over the total for 1958-59.[13] By March 1960 expenditure in the current year already exceeded expenditure in the preceding year by £94 millions.[14] It is difficult to see how the increase could be very much reduced in the next three months. National welfare, and payments to the States, are heavy commitments which will appear again in the next Budget with increased totals; similarly, defence services and repatriation cannot easily be reduced. The only item of expenditure on which any serious onslaught could be made is that for capital works, but as this is only £142 millions, it is hard to see how it could

13. Excess of £1,385 on £1,288 millions.
14. Excess of £986 on £892 millions.

be reduced by more than £30 or £40 millions, and even a reduction of this magnitude would no doubt jeopardize very desirable capital schemes.

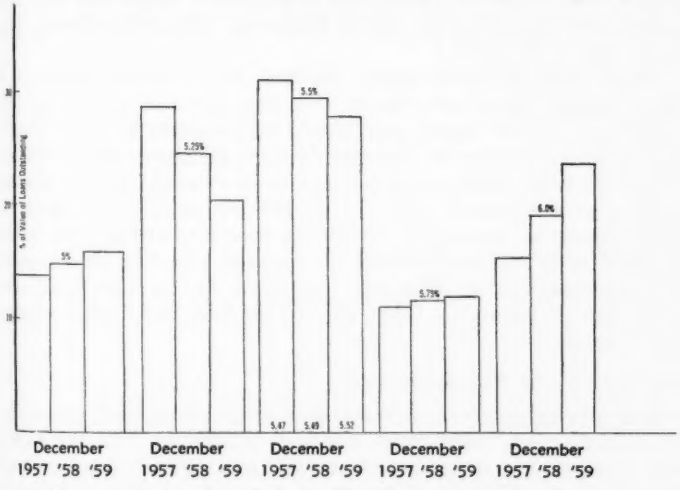
From February 10th, 1960, the statutory reserve deposit ratio was raised from 16·5% to 17·5%. The increased ratio represented a further stage in the programme of absorbing excess bank liquidity, which had begun with calls on the trading banks' special accounts in October and November, 1959.[15] Loans outstanding by the major trading banks in March 1960 were £7 millions less than in December 1959; they were, however, £49 millions more than in March 1959. By December 1959 an increasing percentage of loans were being made at 6% (23·7% against 19·4% a year earlier), and a much lower percentage were being advanced at from 5% to 5½%.[16]

Total loans outstanding rose by only £16 millions (less than 2%) between December 1958 and December 1959, but debits on customers' accounts by all cheque-paying banks rose by ever-increasing percentages in the eight quarters to the end of March 1960 (by 17·8% in the last quarter).

Table 5[17] shows that hire purchase finance advanced in the fourth quarter of 1959, and continued to advance in the first two months of

DIAGRAM 1

Loans Outstanding December 1957 – December 1959



15. *Treasury Information Bulletin*, No. 18, April 1960, p. 21.

16. *Op. cit.* Diagram 1 illustrates this upward drift in rates, within the range 5·47% to 5·52%. The policy of keeping an "average" of 5·5% presumably allows a margin of 5·46% to 5·54% inclusive, so a further drift upwards would be possible. Loans at 5% had to be increased to maintain the average. It would be interesting if the types of clients favoured with loans at these low rates were known.

17. Which is a continuation of Mr. Boxer's Table VIII, *op. cit.*, p. 309.

TABLE 5

Amounts Financed Under New Retail Hire Purchase Agreements

(*Percentage change on corresponding period of preceding year*)

	Motor Vehicles, Textiles, etc.	Plant and Machinery	Household and Personal goods	Total
1958-59 Quarter				
September	+19·7	+38·6	+29·3	+23·9
December	+18·2	+52·1	+5·0	+16·1
March	+3·7	+23·5	—11·8	—0·2
June	+7·8	+30·2	—13·0	+2·7
1959-60 Quarter				
September	+14·5	+19·6	—12·5	+7·1
December	+21·2	+15·2	+6·0	+16·5
1960 Month				
January	+18·5	+50·0	+8·7	+17·0
February	+24·6	+18·2	+1·8	+17·4

Source: Continuation of Mr. Boxer's Table VIII, *Economic Record*, No. 72, p. 309.

1960. The percentage increases for motor vehicles, plant and machinery have been spectacular, and even in the household sector business has recovered. Balances outstanding in respect of retail hire purchase totalled £404 millions at the end of February 1960, £62 millions more than a year previously.

There may be some doubts whether the measures adopted to reduce liquidity and government spending will suffice to offset the upward pressures of rising population, high exports and an unsatisfied need for capital goods. Presumably these measures will be pressed further. At what point are they likely to be relaxed? In the absence of any good measure of "growth" of the economy, deflationary (or anti-inflationary) campaigns are usually waged up to the point where the tendency to full employment (or towards over-full employment) has been counteracted. The key, therefore, to the likelihood, and desirability, of the policy being pressed further, lies in the employment figures.

Employment and Unemployment

The present purpose of examining employment and unemployment statistics is to estimate the progress of inflation, and the ability of the Australian economy to adapt itself to a difficult overseas payments situation. The completeness of coverage of the statistics is immaterial for these purposes, provided only that they are reasonably self-consistent, and reliable as indicators of trends.

The index derived from comparing registered unemployed with registered vacancies has fallen sharply, for if June 1959 was the base, in March 1960 it stood at 53·3. As the graph shows (see Diagram 2),

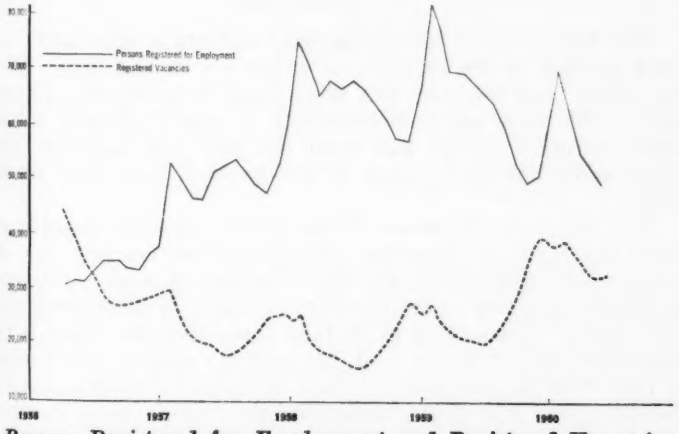
TABLE 6

Excess of Registered Unemployed over Vacancies

Quarterly Average		Numbers (000's) (1)	(1) as % of June 1959 (2)
1957	March	24·2	51·4
	June	27·2	57·8
	September	30·5	64·8
	December	27·6	58·6
1958	March	47·8	101·5
	June	49·7	105·5
	September	44·8	95·1
	December	33·6	71·3
1959	March	51·9	110·2
	June	47·1	100·0
	September	33·1	70·3
	December	15·2	32·3
1960	March	25·1	53·3

Source: Department of Labour and National Service. Monthly Review of the Employment Situation.

DIAGRAM 2



Persons Registered for Employment and Registered Vacancies, March 1956 – May 1960

this has been due rather more to a rise in vacancies than to a fall in unemployed; the "scissors movement" of the two series is typical of increasing labour demand, and is a clear indication that demand as well as cost inflation are working in conjunction. The "scissors" have not crossed, however, as they did in the reverse direction in 1956, so the demand pressure is not extreme over the economy as a

whole. No acute over-full employment yet exists. Moreover, the two lines are not moving together as fast as they did in the months preceding some previous episodes of labour shortage.

TABLE 7

Civilian Employment
(Excluding Rural and Household Domestic)

(Thousands)

Industrial Group	March 1958	March 1959	March 1960	Change 1958-59	Change 1959-60
Forestry, Fishing, Trapping ..	25·8	25·5	25·6	—0·3	+0·1
Mining and Quarrying	53·8	50·2	50·4	—3·6	+0·2
Manufacturing	1119·7	1128·4	1173·3	+8·7	+44·9
Building and Construction ..	204·7	209·3	211·7	+4·6	+2·4
Transport and Communications	351·1	353·1	353·4	+2·0	+0·3
Property and Finance	111·3	116·5	124·8	+5·2	+8·3
Commerce	456·1	460·2	474·6	+4·1	+14·4
Health Services	109·2	114·2	119·1	+5·0	+4·9
Education	100·0	108·9	116·3	+8·9	+7·4
Public Authority N.E.I. ..	133·2	135·8	137·2	+2·6	+1·4
Other	233·0	234·6	239·2	+1·6	+4·6
Total	2897·9	2936·7	3025·6	+38·8	+88·9

Source: Commonwealth Statistician. Monthly Bulletin of Employment Statistics.

The figures for civilian employment indicate a remarkable continued increase in the employment of persons in the labour force, some 89,000 (over 3%) new jobs being found, bringing the employed force, outside rural and household work, to over 3 millions. All recorded industrial groups had some net gain, but manufacturing showed easily the lion's share of the increase (over half of the 89,000).

This completes the sketch of the present economic position reviewed aggregatively. Questions left unanswered are how far the measures now being applied can hope effectively to meet the internal inflationary pressures on the economy, especially while a prosperous export market does nothing to diminish those pressures. What is the quantitative rate at which local (Australian) output plus imports can rise? Will the halt to rising bank liquidity have any noticeable effect on prices? Will the temporary brake on general wage increases be held on long enough for the current upward movement in costs and prices to "peter out"?

Answers to these questions must be speculative; here are some attempts.

(1) Production in the economy as a whole will have gone up by not less than 4·5% in the calendar year 1960. It must do so if average employment runs at 2·5% above the average for 1959, and if productivity over-all increases by 2% (Dr. Salter's "middle estimate" for 1959). This figure may well be too low for 1960, since if it remains

a year of high demand it will be a year of exceptionally full use of installed capacity. (The A.N.Z. Bank figures show a rise of 12·7% for factory production, July 1959 to March 1960). It is extremely unfortunate that the true rise in productivity can only be guessed; if it were 3% instead of 2% an entirely more favourable picture would emerge.

(2) Imports will certainly exceed those of 1959; the increased supply of goods will damp inflationary pressures. But since incomes, and the demands of consumers, are still rising, it seems unlikely that imported goods will exert much downward pressure on prices in 1960.

(3) The reduction in bank liquidity may slightly reduce the extent to which purchasers of durable goods (intermediate or final) anticipate their rising incomes. This will certainly not reduce prices, but may slightly damp their rate of increase.

(4) Pressure for wage increases will be resumed in October or November, and as a result of the continuing shortage of labour it must be to some extent effective. Prices by then will be 4% or 5% above the levels at the last round of increases, and whatever official policy-makers may say, it seems unrealistic to suppose that wage-rates can be held absolutely firm in these conditions. Earnings may rise faster than wages.

(5) The current upward movement in costs and prices will not "peter out" as the White Paper wishfully supposed; it will run at a less rate than 6%, and will, with luck, progressively decelerate.

By 1961 other problems than those of short-term inflation may have begun to assume a pressing importance. In the meantime, the situation outlined above does not seem at first glance so critical, or so close to the limits of the economy's resources in labour supply or capital, as to require drastic anti-inflationary measures.

A Matter of Policy

The rise of prices is moderate so far, but its continuance, its persistence, and the fact that it is (internationally) relatively high are serious. It is true that rises in imports and in labour productivity are offsetting factors, which have so far shielded the economy from the full impact of the wage increases of 1959. If, however, the rise in imports, in step with the rise in exports, has been easily financed to date, this is undoubtedly partly due to temporarily favourable circumstances (such as the recent inflow of funds from South Africa, and the relatively high price of wool). Any long-term view suggests that there will have to be a marked increase in Australian exports, which will reintroduce inflationary pressure from the demand side. Similarly, on the more general level, the recent state of the economy is one of high demand, and this condition, if it remains, is quite sufficient to outweigh gains in productivity, as all recent history has shown.

Is there a case, then, for damping down the inflation immediately, to the point of some stability in retail prices? There are several points

to make on both sides, and different economists are bound to arrive at different judgments on this matter. It may be generally agreed that the longer the inflation persists, the more disturbing its side-effects become (such as the boom in land values and equities), and the harder it will be to bring the economy back to moderation without painful re-adjustments.

Already any deliberate ending of the inflation would undoubtedly cause losses to those who have invested in the belief that the inflation will persist. The argument is sometimes used that to avoid those losses, and to promote growth, it is better to allow the inflation to proceed. Furthermore, it can in general be argued that a certain amount of inflation may stimulate an economy to a rate of investment and of growth that it would not otherwise achieve; it stimulates, too, a full utilization of capacity. There may be in consequence a more rapid increase in labour productivity than would otherwise occur, and, in the long run, this increase would be the best defence against inflationary forces. This argument may well have been relevant to Australia in 1959-60, and it would not be prudent to be so squeamish as not to accept the very real advantages of temporary inflation over a few years; but the question is, does the argument still apply to 1960-61?

The question really can be translated into a choice, and the choice will have to be made as a matter of policy. No more—or not much more—needs to be done than is now being done, to damp down the rise in prices; if things are left as they are, Australia may gradually become a high price/high cost economy, with adjustments by way of devaluation from time to time. The alternative is to cut down the inflation by sufficiently heroic monetary and fiscal measures, in the hope that once this has been done, growth of the economy will be resumed at a faster rate, and on a sounder basis.

The issue should be discussed not as stability versus growth, for the arguments in favour of ending the inflation are not based on any *a priori* value judgment in favour of equilibrium as such. The argument is, that however tolerable and useful short runs of inflation may be, unending inflation has consequences of a harmful cumulative kind. The most useful inflations, it might also be said, are paradoxically those that occur when the public in general, and to some extent the authorities, are convinced that they will not. In these circumstances the velocity of circulation may fall, and if inflation does occur it may only be the minimum reflex action of the price system to slight over-investment by public or private enterprise. The present system is far more unstable, just because all behaviour patterns are being adjusted to a long period of rising prices. As 8% loans become the order of the day, a penal rate may have to be astronomical. The dangers of over-trading and bubble-blowing become visible.

There are then powerful considerations in favour of short, severe action by the monetary authorities to end the inflation in 1960. It may well be argued that this is a propitious moment for an ending of the post-war inflation. Employment is very high, the overseas pay-

ments position is temporarily sound, and no general election is immediately in prospect.

Furthermore, a postponement of action until 1961 might mean leaving the inflation to be dealt with at the very time that a payments crisis was about to develop. At such a moment the problem is naturally far more intractable, since the overseas payments difficulties may suggest *both* the urgent need of an anti-inflationary policy *and*, if there is temporary unemployment, the need of a recovery programme, and in any case reacting to a crisis leaves less room for manoeuvre than a deliberately chosen policy of flexibility.

The traditional arguments against such measures are that they would arrest economic activity, slow down growth, and cause difficulties to the government of a developing economy which needs to raise money by public loan. The first two points are not now convincing; economic activity could be reduced to some extent with advantage. There is no immediate danger of general unemployment. If a short period of high interest rates caused special hardships to appear in some districts, these could be taken care of by special financial concessions. As for growth, the ending of inflation (especially if, as will be argued later, it is brought about partly by fiscal policy aimed at holding back consumption) is as likely to promote as to curb growth; this is the counter-argument.

The "embarrassment" of a borrowing government by a policy of high interest rates is not an objection that can be lightly dismissed. The annual desired loan-raising of the Commonwealth has been of the order of £200 millions a year, and interest payments on loans are a burden on the budget. If rates of interest for government loans were forced up by 1% or 1½% the increased burden of debt would not be entirely negligible. The counter-argument would be to point out that an extra £1 million a year interest charge (or £2 million for that matter) on every £100 millions raised is not an intolerable addition to current interest outgoings of £24 millions (reduced from £48 millions in 1948-49). Furthermore, difficulties of raising loan money, especially in a year when financing heavy conversions of stock are due, are already considerable; in fact, the desired amount of loan money was not forthcoming in 1959-60, a symptom of the unrealistic interest rates that were then being offered.

To eradicate the inflation, monetary measures would raise the general level of those interest rates that are more or less directly within official control, and reduce the gap between these rates and those paid by the new institutional borrowers who get funds direct from the public. These measures could be strengthened by fiscal policy. Monetary measures, to be effective, would have to include direct, or induced, sales of long-term government bonds by the Reserve Bank, or perhaps the deliberate cessation of any policy of supporting the prices of these bonds would suffice. The essential point is that the authorities, to render their policy effective, must be prepared to see bond prices fall.

The objectives of monetary combined with fiscal policy might well be to maximize investment expenditure and to slow down the increase in personal consumption expenditure, not merely for the purpose of a short-term answer to inflation, but as a counter-cyclical remedy. This implies raising taxes in such a way as to allow consumers to increase their consumption by less each year than has recently been customary (by perhaps 25% of the increase in the real National Income, annually, the remaining 75% being ear-marked for investment). Fiscal measures to carry out this policy would perhaps involve increasing receipts for taxation this year by 5% or 6% in total, to keep an additional £100 millions from consumption.

The policy might reduce inflation or worsen it according to the taxpayers' response to the new situation. If the authorities convinced the country of their readiness if necessary to pursue the policy for a year or two, the result should be the stimulation of private savings, and less inflation, even in the short run. This would reduce the necessity for severity of taxation in subsequent years. This policy is more direct, and should be more effective, than mere cutting of expenditure, which is undesirable if it violates the principle of maintaining investment as high as possible.

To combat the short-run inflation, the important thing is (as Dr. J. O. N. Perkins has remarked[18]) "that the Budget as a whole should be sufficient to keep demand from expanding faster than the rate of increases in output plus imports". This *might* be possible without any increase in nominal income tax rates, for several reasons—because new taxes were introduced,[19] or because the rise in inflation itself automatically raised the percentage of incomes taken in tax, without any change in the income tax rate. A sufficient gain in tax receipts might reach the Treasury during 1960-61 even despite some reduction in nominal rates of tax. Even so, fiscal policy would be in use in an anti-inflationary direction, provided that sufficient surpluses over expenditure were allowed to continue.

(It is not quite clear, indeed, what the announced intention of the Commonwealth Government to achieve a "balanced" budget this year really means; is it a threat that taxes will be reduced, come what may, to the level of planned current expenditure? This can hardly be the intent, since the Government is committed to many items of capital expenditure. A precise interpretation of policy is perhaps not possible, or intended to be available, as the Treasury may prefer to delay announcing an exact policy until the latest possible date.)

If fiscal policy is to be brought into play for anti-inflationary purposes, alternative forms of taxation will no doubt receive serious consideration. This is not the place to consider their respective merits,

18. In *The Australian Financial Review*, 23/6/60, p. 17.

19. A capital gains tax, or a special investment levy on company income (undistributed profits especially) have been put forward for discussion. (Perkins, *op. cit.*)

but our present diagnosis of the state of the Australian economy suggests one argument in favour of increasing receipts from income taxes—namely, that in the immediate future the rise in personal consumption ought to be temporarily slowed down (it will be forcibly curtailed by crisis if some deliberate slowing down of the increase is not adopted). There is little doubt, too, that fiscal policy will have to be more forcibly used to keep the Australian economy from getting further out of step, as regards costs and prices, with the industrial countries in Europe and America which have largely overcome the extremer forms of inflationary pressure. Even in those countries the desired objective of greater stability might, in some instances, have been more generally, or more smoothly, reached if fiscal as well as monetary restraints had been imposed.[20]

The Australian economy's need for fiscal measures is particularly great for the reason that Dr. Perkins has so clearly set out in his article already quoted—the insufficient use, hitherto, of the raising of interest rates. Fiscal measures are now necessary; but this does not mean that measures of monetary policy will not still have to be pursued. Here again it is a matter of policy; if the decision were to be taken to use interest rates effectively, all the rates over which some official control can be exercised might have to rise to an all-time high. Government bond prices would then have to slump. There would eventually be switching from equities into bonds (at their reduced prices), and a fall in equity share values.

Short of fiscal and monetary policy measures of sufficient severity, the Australian economy will enter on the next phase of any cycle in world wool prices (which may well be downwards) with a vulnerable economic structure, rising costs tending to drive marginal export producers out of the markets. There is no sign of critical pressure on the Australian pound in 1960, but such pressure would almost certainly arise in 1961 (unless some unexpected rise in export values had occurred by then) as a result of high imports and lagging export receipts. The future of Australian exports depends upon, among other things, the laying of the inflationary ghost. It would not take long to exorcise—but if the ceremony is delayed the crisis that will build up for next year will be the more intractable, and the job will still have to be done. The conclusion must be that the remainder of 1960 will see either the ending of inflation in Australia, or its steady progress, according to the policies adopted, and if the rise in prices and costs is not checked the outlook for 1961 is correspondingly more gloomy.

Part II. The Future of Australian Exports

The Target

Mr. McEwen stated to the National Export Convention that "after a lot of research the Export Development Council says that

20. Of the period 1954-57, the O.E.E.C. annual economic review (March 1959) states "in most countries (within the O.E.E.C.) inadequate use was made of overall restraint exercised through fiscal policy", p. 30.

we need to expand our export earnings by as much as £250 millions in five years''. This was the target put before the Convention for 1965, and it seemed formidable, but even this target, in the light of further information given to the conference, was probably a modest one. The Gross National Product, as Dr. W. A. Westerman stated, might well rise within the next decade by 50% as compared with 1959, and it might even reach this figure by 1965. The additional national gross product of some £3,000 million could imply additional imports of £400 or £500 millions. There are grounds for believing that over this range of increase the National Income is going to depict a high marginal propensity to import.

That the order of magnitude of the task that Australia has in hand is higher than £250 millions is probable, on other grounds, for instance, because it is unwise to assume that the average rate of import of capital into the country can be sustained over six years as high as it is now running. Many countries are planning for capital imports, and institutions are being created, such as the development banks and the E.E.C. Joint Committees, to channel surplus savings into underdeveloped areas. There are the enormous requirements of India, for example, and it is to be presumed that some part of these at least will be met out of exportable surpluses from Europe and from America.

If, then, the target is of the order of £400 millions rather than £250 millions, this implies something like a 45% increase in exports. The measures so far adopted to increase exports have little relation to a target of this magnitude. As Dr. Westerman himself observed, ''the present role of government in export development is not one which has been carefully planned and laid down. It is a role which has been assumed largely as a result of the exigencies of export development arising from time to time. It has come about from a Topsy-like process. It has not been modified either on the initiative of government itself or at the behest of commerce and industry.'' In the next period ahead the process of modification is likely to be further speeded up. The existing government agencies for assisting exporters, and for negotiating treaties which assist Australian exports, will presumably be strengthened and expanded.

If we think in terms of a 40% or 50% expansion in value of exports as applied individually to each of the main commodities now sent overseas from Australia, the first impression is not an encouraging one. The principal items of export are wool, meats, fruit, sugar, dairy products, hides and skins, iron and steel, barley, lead and zinc; in no one of these commodities is there any sign of an expanding market of this magnitude. World consumption of sugar has, it is true, risen extremely fast, but supply comes from many other countries than Australia, and has been adequate to meet demand. Apart from sugar, alternative sources of supply exist for several of the other commodities. Meat production is possible in many parts of the world, and highly protected by many of the importing countries. Fruit pro-

duction is not expanding particularly fast for export purposes, and again there are many specialist producers in Africa, America and the Middle East and Mediterranean countries, which are in a good position to compete.

In addition to the main categories of exports there are the many thousands of separate items which make up 25% of Australian exports. These are in many cases directed to more expansive lines than the staple exports. For example, civil engineering machinery, luxury items like swim suits, drugs and medical supplies, locomotives, timber and many other items which individually do not amount to a high percentage of total exports, have a potential market, and may perhaps be expanded more vigorously than some of the staple exports. The question arises whether the exact type of a particular industrial commodity is well designed to meet the needs of the growing world market, or whether for lack of specialization, or for some other reason, Australian commodities are not in the forefront from the point of view of quality and appeal to the marginal consumer. Some undoubtedly are, but the proportion needs to be increased.

A 40% expansion in exports will be difficult to bring about without very careful planning, and a full use of all the resources available for selling overseas. It is perhaps not sufficiently realized that skill in selling is one of the scarce resources, and that Australia needs to make the fullest possible use of its best personnel capable of organizing sales campaigns, marketing boards, overseas trade commissions and other activities in this field. This skill needs to be mobilized, and additional vigorous personnel trained to obtain for each industry whatever is required. It would seem very useful at some stage, although it cannot be attempted here, to break down the target of a 40% increase into individual targets for different commodities, or groups of commodities, for each group to be supervised by a sufficiently high-powered political and business controlling council to see that bottlenecks are broken and difficulties smoothed out as they arise. Some such campaign for exports is likely to be developed, and our problem is for the moment to see what its effects on the economy are likely to be in the immediate future.

Patterns and Trends in International Trade

The pattern of Australian visible trade is brought out in Table 8 where it is shown that the substantial surplus of 1956-57 was lost during the next two years, but is likely to be regained in the current year 1959-60. Owing to the large sum of invisible payments the balance on the payments basis is usually unfavourable to Australia. Invisible items, of course, include foreign travel, government transactions, freight and insurance payments, public authority gifts, private remittances, interest, dividends and profits and undistributed profits accruing to international creditors. These invisible items are not easily analysed by provenance or source, and for this reason it

TABLE 8

£m.

	Balance of Payments Basis			Trading Accounts Basis (*i.e.*, comparing visible trade items only)		
	Exports*	Imports†	Balance	Exports	Imports	Balance
1954-55	885	1144	—259	778	847	—69
1955-56	905	1143	—238	788	820	—32
1956-57	1133	1043	+90	994	718	+276
1957-58	974	1151	—177	828	790	+38
1958-59	969	1156	—187	826	793	+33
1959-60	(1055)	(1225)	(—170)			
1960-61	(1050)	(1325)	(—275)			

Source: White Papers.

*Including other net rent, interest, etc., and private remittances.

†Including public authority overseas gifts, relief, etc., private remittances, public authority interest, net dividends, and remitted profits, net undistributed profits.

is convenient to consider visible trade items first in examining the pattern of international transactions.

Table 9 shows for two years the excess of the percentage of exports going to six groups of the world from Australia as compared with the percentage of imports coming from those areas. Australian trade can be summarized by stating that it is in deficit with three main areas of the world, namely the United Kingdom, the United States, and the rest of E.F.T.A. other than the United Kingdom. On the other hand, Australia is in credit with the remaining three areas, classified under the headings the "Rest of the Commonwealth", the E.E.C. countries, and "all other" countries. Putting the matter diagramatically we may represent Australia as being in a triangle of trade with net exports to one group of countries balancing approximately the net imports from the other group.

The invisible items of trade are not evenly spread over the six areas, and mostly amount to debts incurred to the group of countries

TABLE 9

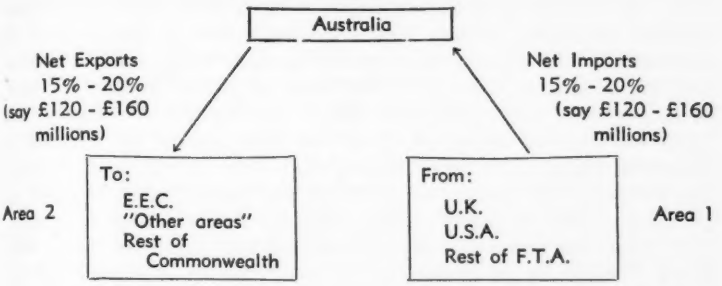
Australian Trade by Areas

(*Percentage Exports Less Percentage Imports*)

	1957-58		1958-59	
United Kingdom	—13·97		—6·93	
Rest of Commonwealth		+5·28		+4·16
E.E.C.		+10·08		+4·52
Rest of F.T.A.	—2·76		—2·88	
U.S.A.	—7·64		—6·14	
All other		+9·01		+7·27
	—24·37	+24·37	—15·95	+15·95

Source: C.B.C.S. *Overseas Trade.*

DIAGRAM 3



with which Australia is in visible trading deficit. The total deficit with these areas has to be covered by imports of capital.

Australia's persistent deficit, or tendency to deficit, occurs because its substantial adverse balance on the invisible items is not completely and adequately covered from time to time by capital movement. If the National Income grows and imports rise correspondingly there will have to be a marked increase in capital inflow. Beyond any such increase it is evident that Australia must depend upon the triangle of world trade. It is apparent, therefore, that Australia is concerned with three things: not to encourage too great a deficit with Area 1; to promote as far as is possible an increase in the surplus with Area 2; and to support such free flow of goods and services between all areas as will enable surpluses and deficits to be covered by world-wide international trade. On the third point it is evident that, other things being equal, Australia has an interest in the E.E.C. and the "other areas" of the world (this includes Japan) being able to earn a surplus on balance in the markets of the United States of America, the United Kingdom, and the "other" free trade areas.

It is thus by no means a matter of indifference to Australia if a trade war in Europe develops in such a way as to disrupt intra-European trade flows, or if the persistent export surplus of the United States is once more resumed, for any of these adverse developments might cause an irremediable break in the chain of transactions. Australia has a direct interest in the bridging of monetary gaps between the sterling area, the dollar area and the E.E.C. area.

According to the analysis, if this pattern of trade persists Australia will tend to be well supplied with E.E.C. currency and dollars, and not so easily supplied with sterling. It is important, therefore, so long as Australian reserves are held in sterling—and there is no implication here that they should not be—for the E.E.C. unit to be readily transferable into sterling at stable exchange rates.

The general pattern of world trade has been so well documented that there is no need to repeat details here. The total volume of world trade increased much faster in relation to production after World War II than in the period between the two wars. The increase in the

volume of world exports from the industrialized countries rose, however, much faster than the increase in exports from the non-industrialized countries, among which Australia has to be counted in relation to world exports. Much of the increase in the exports of non-industrialized countries was in the form of petroleum and oil, and, excluding these commodities, the rise in the exports of primary products was only of the order of 8% or 10% against an increase in industrial commodities of something like 70%. In very recent years this tendency has persisted. In 1959 the world index number of quantity of exports for industrial countries had risen by 41% since 1953, while the index for other countries was somewhat below this figure (35%). In particular, continental western Europe, with its astonishing economic recovery, showed an increase in quantity of exports of 75%. Even more important, from the Australian point of view, was the price movement which had moved the terms of trade against the non-industrial countries.

Countries with a heavy dependence on agricultural exports were finding themselves in the late 1950's in an especially difficult position. India, for example, with its great staple exports of jute manufactures and tea, has failed substantially to increase its export income, while every increase in its National Income brings more pressure on the economy in the way of a rising import bill. Import restrictions in India notwithstanding, imports have to rise from year to year, as the various economic plans take effect. Australia is not in quite so critical a situation since the demand for wool, sugar and meat, although fluctuating, has not been so stagnant as the demand for jute and tea. Australia suffers like India, however, from being an importer and not an exporter of petroleum and oil.

There are other reasons why agricultural exports are relatively sluggish compared with manufacturing exports. There are, for example, the institutional barriers; under the General Agreement on Tariffs and Trade, tariffs are negotiated at successive conferences, and many tariff concessions have been made which have practical significance for industrial goods. It is much less easy to negotiate concessions for agricultural exports, in view of the arrangements which protect agriculture in the importing countries.

Yet a further reason for the difficulties of agricultural exports in a world of rising industrial output is that industrial prices are less open to competitive variation. They tend to be "administered prices", even though there is some competitive element affecting their level, while the prices of agricultural exports are determined by far more competitive procedures.

In the immediate short run it may well be that Australia has little to fear from the changing institutions of the western world, particularly from the formation of the E.E.C. The E.E.C. is one of the areas with which Australia has a visible trade surplus. This has not passed unnoticed among the governments which came to sign the Common Market Treaty at Rome. It follows that Australia may have

some bargaining power in direct relation to E.E.C. since it is in a position to offer markets to the industries of that area, and in exchange for such markets to negotiate favourable entry terms for its products into the E.E.C. market. By obtaining more of its manufactures from the E.E.C., Australia may gain, particularly in the short run, certain advantages; for example, it might be able to obtain some of these manufactures more cheaply than from Great Britain, or from other traditional suppliers, if the E.E.C. industries expand and are able to offer some lines of goods to larger markets at cheaper costs per unit. The obverse of this would be that Australia would cut down further its dependence upon relations with the United Kingdom, and thus might gain further bargaining power to secure markets in the United Kingdom and to prevent any adverse developments in those markets.

This happy outcome, however, surely depends on a fortunate combination of circumstances which may apply only to the short term. There is certainly no immediate danger of Australia losing markets in the E.E.C., or failing to get some of its supplies from the E.E.C. on rather favourable terms. But for any longer period there are other points to take into consideration. If we look at the Australian relations with each of the six major areas of Table 10 the following picture emerges. So far as Britain is concerned, Australia has been expanding its sales of foodstuffs there in recent years, although it so happens that wool has declined in value. Its exports to Britain have fallen in the three years covered in the tables, and its imports from Britain have also fallen, but there are healthy signs of growth in the market for foodstuffs. This market has been the one to which promotional expenditure has probably been correctly directed, since there are great potentialities of growth, and Australia seems to be able to secure some of them. There has been some increase in the sale of foodstuffs to the U.S., but on the other hand there is a tendency for imports from the United States to rise. The deficit with the United States has already tended to worsen and may deteriorate further. There is negligible trade with the rest of the Free Trade Area, although there has been some rise in imports from that area. If we now look at the areas with which Australia is in credit, we see that, while there has been an enormous decline in the sales of wool to the E.E.C., there has been no offsetting recovery in the sale of foodstuffs there. On the other hand, there has already been a substantial rise in imports from the E.E.C. Any continued favourable balance with the E.E.C. therefore depends on a recovery in the sales of wool there, and on some increase in the sale of foodstuffs. There is some hope that wool will maintain its level, but there are also reasons for fearing that wool is not a long-term bet. The more advanced industrial countries, particularly America, have largely moved away from the use of wool for apparel, and if the other industrialized countries eventually follow the American example a similar stagnation in the apparel wool market will develop in Europe, and other industrialized

TABLE 10

(a) *Australia–United Kingdom Visible Trade* (£*mn*)

	1956-57	1958-59	Change
Exports: Foodstuffs (I-III)	123·3	152·4	+29·1
Animal Substances (VI)	120·4	73·3	—47·1
Metals, etc. (XII)	19·9	16·2	—3·7
Total: Three main items	263·6	241·9	—21·7
Grand Total: All items	277·5	256·9	—20·6
Imports: Metals, etc. (XII)	170·2	168·1	—2·1
Yarns, etc. (VIII)	41·6	36·9	—4·7
Pulp, Paper, etc. (XVI)	20·2	21·7	+1·5
Total: Three main items	232·0	226·7	—5·3
Grand Total: All items	296·2	307·4	+11·2

(b) *Australia–United States Visible Trade* (£*mn*)

	1956-57	1958-59	Change
Exports: Foodstuffs (I-III)	3·8	27·0	+23·2
Animal Substances (VI)	22·6	13·9	—8·7
Metals, etc. (XII)	21·2	10·5	—10·7
Total: Three main items	47·6	51·4	+3·8
Grand Total: All items	66·1	60·7	—5·4
Imports: Metals, etc. (XII)	49·2	58·8	+9·6
Tobacco, etc. (IV)	9·8	10·5	—0·7
Oils, Fats (IX)	6·2	5·4	—0·8
Total: Three main items	65·2	74·7	+9·5
Grand Total: All items	95·5	108·5	—13·0

(c) *Australian Visible Trade with the Rest of the F.T.A.* (£*mn*)

	1956-57	1958-59	Change
Exports: Grand Total	7·6	5·7	—1·9
Imports: Metals (XII)	6·4	8·4	+2·0
Pulp, Paper (XVI)	6·3	6·7	+0·3
Yarns (VII)	3·2	2·9	—0·3
Total: Three main items	15·9	18·0	+2·1
Grand Total: All items	18·0	19·0	+1·0

There are no substantial lines of exports but imports have been rising.

(d) *Australian Visible Trade with the E.E.C.* (£*mn*)

	1956-57	1958-59	Change
Exports: Animal Substances (VI)	205·3	110·3	—95·0
Foodstuffs (I-III)	16·7	17·8	+1·1
Metals (XII)	1·2	4·4	+3·2
Total: Three main items	223·2	132·5	—90·7
Grand Total: All items	232·5	139·9	—92·6
Imports: Metals (XII)	24·7	39·7	+15·0
Yarns (VIII)	14·4	13·9	—0·5
Chemicals (XIX)	7·5	7·9	+0·4
Total: Three main items	46·6	61·5	+14·9
Grand Total: All items	67·5	84·1	+16·6

(e) *Australian Visible Trade with "Other" Countries*

	1956-57	1958-59	Change
Exports: Animal Substances (VI)	117·6	90·9	—26·7
Foodstuffs (I-III)	18·2	18·6	+0·4
Metals, etc. (XII)	15·5	9·3	—6·2
Total: Three main items	151·3	118·8	—32·5
Grand Total: All items	213·9	180·0	—33·9
Imports: Oils, Fats (IX)	38·8	45·8	+7·0
Yarns, etc. (VIII)	7·2	18·4	+11·2
Foodstuffs (I-III)	5·1	6·3	+1·2
Total: Three main items	51·1	70·5	+19·4
Grand Total: All items	114·9	145·5	+30·6

(f) *Australian Visible Trade with Rest of Commonwealth*

	1956-57	1958-59	Change
Exports: Foodstuffs (I-III)	76·1	55·9	—20·2
Metals (XII)	32·2	31·4	—0·8
Oils, Fats (IX)	10·8	12·2	+1·4
Total: Three main items	119·1	99·5	—19·6
Grand Total: All items	195·3	168·3	—27·0
Imports: Metals, etc. (XII)	15·2	15·7	+0·5
Yarns, etc. (VIII)	17·6	14·9	—3·7
Oils, Fats (IX)	16·1	13·4	—2·7
Total: Three main items	48·9	44·0	—4·9
Grand Total: All items	126·9	132·1	+5·2

(For reference: *Oversea Trade, 1958-59*. Bulletin No. 56, Commonwealth Bureau of Census and Statistics, Canberra)

Class I = Foodstuffs of Animal Origin, not including Live Animals.
Class II = Foodstuffs of Vegetable Origin; Non-alcoholic Beverages, and Substances used in making.
Class III = Spirituous Liquors.
Class IV = Tobacco and Preparations thereof.
Class V = Live Animals.
Class VI = Animal Substances (mainly unmanufactured), not Foodstuffs.
Class VII = Vegetable Substances and Fibres; Cork and Manufactures; and Man-made Fibres except Glass.
Class VIII = Yarns and Manufactured Fibres, Textiles and Apparel.
Class IX = Oils, Fats and Waxes.
Class X = Pigments, Paints and Varnishes.
Class XI = Rocks, Minerals (including Ores and Concentrates) and Hydrocarbons in Solid or Semi-solid Form.
Class XII = Metals, Metal Manufactures and Machinery.
Class XIII = Rubber and Leather and Manufactures thereof and Substitutes therefor (except Apparel).
Class XIV = Wood and Wicker, Raw and Manufactured.
Class XV = Earthenware, Cement, China, Glass and Stoneware.
Class XVI = Paper and Stationery.
Class XVII = Sporting Material, Toys, Fancy Goods, Jewellery and Timepieces.
Class XVIII = Optical, Surgical and Scientific Instruments and Appliances and Photographic Goods, n.e.i.
Class XIX = Chemicals, Medicinal and Pharmaceutical Products, Essential Oils and Fertilizers.
Class XX = Miscellaneous.

parts of the world. There seems to be also little hope, on current information, that the great class of export known as foodstuffs will be substantially increased in the European market. The only likely markets are the United States and the United Kingdom, and perhaps the rest of the Free Trade Area, but these markets, apart from the United Kingdom, are largely new and have not yet been touched by the Australian exporters to any great extent.

This discussion is skirting round the central problem of the relationship of Australia to the United Kingdom, to E.F.T.A. and to the E.E.C. It is most unfortunate that no clear lead was given on this matter at the Conference of Commonwealth Premiers held in London in May 1960. The communique on the conference merely stated that the Ministers had discussed European problems; it expressed concern at any economic division in Europe, noted that the countries of Europe formed an important market for Commonwealth exports, and added two expressions of hope. These were first that the European countries would follow policies in accordance with the principles of G.A.T.T., and secondly that all the problems would be speedily and satisfactorily resolved, with "due regard to the interests of countries outside Europe". These aspirations had little relation to the reality of the case. Important choices have to be made in the matter of future trading policy, and it is difficult to predict the course of events in the absence of any clear lead. One point perhaps ought to be made, and that is that the British reluctance to join the Common Market was based upon, among other things, its unwillingness to put itself in a position where the Commonwealth countries were less favourably placed to the British market than were the countries of continental Europe. This was not the only reason for Britain dragging its feet, but it certainly was a very real reason, and one which was fully appreciated on the other side of the Channel. The French negotiators made it clear that for their part they were perfectly unwilling to admit to the Treaty a country which had preferential arrangements with Commonwealth countries. So far as they were concerned, however slight the preference, it was a real barrier to their exports, and they were not willing to have Britain in with the Commonwealth, nor to have Britain in while she maintained any form of special relationship with the Commonwealth countries.

It follows that, while the United Kingdom cannot easily "go it alone", Australia would put itself in a difficult position if it tried to make use of its surplus with the E.E.C. and other areas to "go it alone" itself. The complete abandonment of Imperial Preference would mean that Australia would have to rely on a market with which it already had a surplus, and in which it would be competing with protected agricultural industries just as much as in the British market, or rather more so; it will have to work hard probably to maintain its surplus, and does not have any obvious chance of increasing it. The British connection has the economic value for Australia that there are well-established markets there with possibilities for expansion.

To give up these possibilities would only be economic sense if the six countries of Europe were willing to give assurances of expansion possibilities in their own markets. These assurances are not likely to be forthcoming. Furthermore, British policy will no doubt have changed in the course of the next twelve months.

This does not lead to any clear conclusion. The point is that Australia has less room to manoeuvre than might appear at first glance. It has certain important short-term advantages to pick up from the present development, and these might well be used to maintain over the next twelve months a reasonable growth in certain lines of export. Australia has every reason to exploit as fully as it can its power of purchasing from Europe, and of selling to the European market, and no doubt full use will be made of this opportunity. This is a very different proposition from saying that a new system of trade can be built on the basis of the present muddle in Europe. It looks as though the old system, weak as it is in many respects, will have to endure for a few more years until something better is worked out on a multilateral basis.

Meanwhile, it is possible that Australian exports in 1961 will be higher than has been indicated in the estimates of Tables 3 and 8 if wool buying in Europe increases in importance.

Prospects for Increasing Exports of Three Major Groups

Apart from tourism, expansion of Australian overseas receipts will come from three groups of exports—mineral, manufacturing and primary products. There is little doubt that mineral exports could be very successfully increased. Australian mineral resources are still not fully exploited, or even fractionally used. The chairman of Mt. Isa Mines Ltd., Mr. G. R. Fisher, has made some startling comparisons showing that Australian primary mineral exports of some £69 millions amount to 10% of exports, and that this figure might very reasonably be expected to be more than doubled on any long-term view. The most important missing factor of production is transport, and after that capital in general. As Mr. Fisher pointed out, Canada's mineral exports form a far bigger percentage of its total exports than Australia's. The construction of roads costing £50 millions might bring a return to the country of an increase of £100 millions a year in mineral exports, it has been suggested, and there is no *a priori* reason to believe that this is a wildly exaggerated figure. Its realism could only be tested if a national development scheme was being seriously implemented.

Secondary output is likely to be increased substantially on any long-term view. The major markets for industrial products may be found in South-East Asia, in Africa, and indeed all over the world. Here is a need for specialization. Australia has no reason to fear that a small country cannot gain a substantial proportion of its export income from secondary production. The examples of countries like Sweden and Switzerland show the scale of the advantages that accrue

from specialization. In the immediate future, however, secondary industrial exports are liable to be kept down by lack of materials. It seems extraordinarily unfortunate that iron and steel exports have dwindled to a trickle at the very moment that an export drive is being launched. This situation can only be resolved by the somewhat heroic measure of cutting down the consumption of exportable commodities on the home market.

Finally, there are the primary producers. Here the great need is to get into expanding lines of demand such as fruit juices, dairy products, processed meats and high quality sausage meat, rice and other crops, as well as the traditional staples of wheat, beef and wool. It is not likely that primary products in themselves will expand as fast as the other clases of commodity. On the other hand they must, since they are the largest proportion of total Australian exports, provide the greatest absolute amount of increased earnings. The promotion of the use of wool is a matter of vital importance for Australia, and here, too, the development of new markets has proved to be already the most important factor. There is no reason to suppose that wool sales cannot be maintained and increased despite the fact that in the advanced countries there may be some stagnation. Huge sections of the world's population are moving up the real income scale, and will reach the stage when woollen clothing and carpets will come within their purchasing power. The Chinese market is especially interesting in this connection, as will be the markets in some of the South-East European countries.

Patterns of Australian Consumption and the Need for Specialization

One fundamental change needs to be made in Australian thinking on the immediate export problems. In addition to the export of so-called surpluses, Australia will need to specialize. The great need is to be able to produce comparatively cheaper and to be able to produce for export itself. The pattern of Australian domestic consumption needs to be related to the present export drive, and to some extent changes in the consumption pattern will have a direct effect on the availability of specialized articles for export.

The five quantitatively most important items in consumption expenditure are food; clothing; tobacco and beer; hardware, electrical goods, furniture; and rent. Of these, food production is rising rather slowly, clothing a little faster, tobacco slowly, alcohol quite fast, and hardware, electrical goods and furniture extremely fast. If consumption expenditure increases over the next six months, as surely it must, an even faster rise in the production of household goods and hardware products may be expected. There is no sign yet of any sharp revival in the sales of clothing generally, apart from footwear, still less of recovery in such unfavourable markets as are supplied by rayon producers or makers of hats and gloves; it would almost seem that the Australian income-receiver of to-day is strongly biased on spending on new gadgets, especially those that bring him at one jump into the

motor car/television class, or in one jump up to a higher rung on the ladder of these forms of conspicuous consumption. The average income-receiver wants a home, and is ready to enter (with some caution in comparison with his American cousin) into the delights of "gracious living". He is an average consumer of new building materials, a fervent buyer of furnishings, household appliances, tobacco and alcohol, but moderate in his regard for health foods (fruit, vegetables, meat and fish) or for personal adornment.

Part III. Conclusion

The export drive, on which the economy is now entering, demands a rapid cessation both of the cost squeeze now being endured by primary producers, and of the profit squeeze now effectively being imposed on the trading banks in the course of their normal banking operations. For an export drive to succeed inflationary tendencies must be under control, and the review of the export situation strengthens the case for monetary and fiscal policy working together to end the rise of prices.

A possible change in events that would modify the form of this argument would be a resumption of inflation in the United Kingdom, the E.E.C. and the United States, so reducing the comparative rate of cost increases taking place here. Although there has been economic recovery in all these areas, and some symptoms of inflationary difficulties in Britain, there seems to be no likelihood at the time of writing that this change will occur. Subject to the qualification that a resumption in the upward trend in world prices could change the picture, it would seem that 1960 may be a year destined to see new forms of monetary control tried out in an Australian environment.

The reasons for a change in policy have been found to be that while investment and consumption are both rising sharply, while demand is high and employment is rising, prices are continually being forced upwards. There have been phenomenal rises in share prices and land values. Costs are rising, and a balance of payments crisis would be bound to occur within a year or so if present trends continued. Moreover, the ever-continuing inflation is rendering government borrowing for essential purposes difficult, and even the control of credit itself increasingly ineffective. The key to a change in policy is the need of a demonstration that prices do not always continue to move in one direction. Expectations will thus be changed and the extreme consequences of the long-lasting flight from money be averted. The usual arguments, both political and economic, against stringency, seem to be less effective when applied to the second half of 1960 than in reference to earlier years. In these circumstances it seems highly probable that monetary stringency, as well as budgetary caution, will be developed by the authorities, and if this does in fact occur, there may be some remarkable changes in the economy to record by December 1960.

IAN BOWEN

University of Western Australia.

THE MISSING KEY

I

The present article will show that not all is well with recent theories of interest and capital. And the term "recent" may be understood here in an almost geological sense: it is meant to cover the whole span of time from the death of Böhm Bawerk and of Wicksell. A few lines of mathematics will establish the conclusion that the conceptual apparatus of the Böhm Bawerk–Wicksellian theory—now almost discarded by economists—is indispensable for future progress; and that practically the whole of the voluminous literature devoted to the discussion of the "period concept" and its alleged difficulties may be pulped.

It is important, however, to have a clear idea what this "theory" really asserts. The reader will not be required to swallow as fruits of serious empirical studies the rather infantile Robinson Crusoe stories with which Böhm Bawerk used to dress up the meagre formulae of commercial arithmetic; nor need he, at any length, partake of the heady wine which Wicksell imagined to mature with the mere lapse of time, without the vintner's loving care and continuous input of other "doses of means of production". (Only schnapps-drinking Scandinavians could entertain such curious notions!) The reader will be required, however, to get down seriously to the mathematical content of the thoughts of these two authors.

Unfortunuately Böhm Bawerk, for all his penetrating power of analysis, had no mathematical skill. Wicksell was better trained in this respect. His achievement is quite staggering for a lonely pioneer. But even in his case it cannot seriously be maintained that he reached finality in the presentation of the complex of ideas which he and Böhm Bawerk shared.

For this reason it is advisable that students of the theory of interest and capital should once more retrace the steps of these two classical authors, who were decidedly on the right trail. It can confidently be asserted that future work in this field will forever remain something in the nature of neolithic horticulture, if the profound hunches of these two authors continue to be disregarded. The calculus of interest and capital can ill dispense with the tools which, to their lasting credit, Böhm Bawerk and Wicksell have tried to introduce.

II

A crushingly powerful force that stands in the way of innovators in this subject is the tradition of commercial arithmetic—a most venerable and ancient tradition. After examining the mathematical content of baked clay tablets which have come to light in ancient temple archives of Babylon and Sumer, Otto Neugebauer states authoritatively: "We know that compound interest was computed exactly as it is in schools today."

The schools of Economics are a case in point. When in their classrooms the demand for an investment that promises to yield a

future income stream $\phi_1, \phi_2, \ldots \phi_T$ is considered, textbooks regularly produce the formula

$$(1) \qquad V = \frac{\phi_1}{1+r} + \frac{\phi_2}{(1+r)^2} + \ldots + \frac{\phi_T}{(1+r)^T}$$

for the present value of this stream, where r is the rate of interest used in discount.

Strip this formula of its superfluous algebraic notation—which after all is only a sophisticated kind of shorthand made fashionable by mathematicians of the 16th and 17th centuries—"put it in words"—and you are left exactly with the instruction to handle your problem after the manner of the ancient Babylonian priests. You are required to obtain from the Temple of Learning prepared Tables of Discount, and then you have to slog your way numerically through every case as it comes. Generality of treatment can hardly thus be obtained, because analytic manipulation of this archaic rule is not easy.

True analytical insight became possible only when Leonard Euler—now almost three hundred years ago—had the liberating thought that problems of compound interest can be handled much better if they are first suitably transformed. He demonstrated once and for all that it is rather hamhanded to set such problems in terms of the price, p, of the loan of a unit of money for a unit of time, or in terms of the corresponding annual rate of interest, r. A much more suitable parameter is his instantaneous rate of interest ρ which is defined by

$$(2) \qquad p = 1 + r = e^{\rho}.$$

This simple substitution at once changes the cumbersome expression (1) into something capable of analytic manipulation:

$$(3) \qquad V(\rho) = \int_0^\infty e^{-\rho t}\phi(t)\,dt$$

—provided, of course, that suitable adjustments have been made to describe the discrete series $\phi_1, \phi_2, \ldots \phi_T$ by means of a statistical distribution density, $\phi(t)dt$, which is understood to take the value zero for all $t>T$.

Now the nature of the demand for an investment can immediately be deduced in full generality. We observe that

$$(4) \qquad \begin{cases} V(o) = \displaystyle\int_0^\infty \phi\,dt > 0, \ \lim_{\rho\to\infty} V(\rho) = 0, \\ \dfrac{dV}{d\rho} = -\displaystyle\int_0^\infty te^{-\rho t}\phi\,dt < 0, \\ \dfrac{d^2V}{d\rho^2} = \displaystyle\int_0^\infty t^2e^{-\rho t}\phi\,dt > 0, \end{cases}$$

and that all derivatives of odd order are negative, of even order positive.

Hence we conclude that we are dealing with a demand curve that is convex downwards, *i.e.* for any two points A and B on the curve the arc $\widehat{AB}$ lies to the left and below the chord $\overline{AB}$. Cf. Fig. 1.

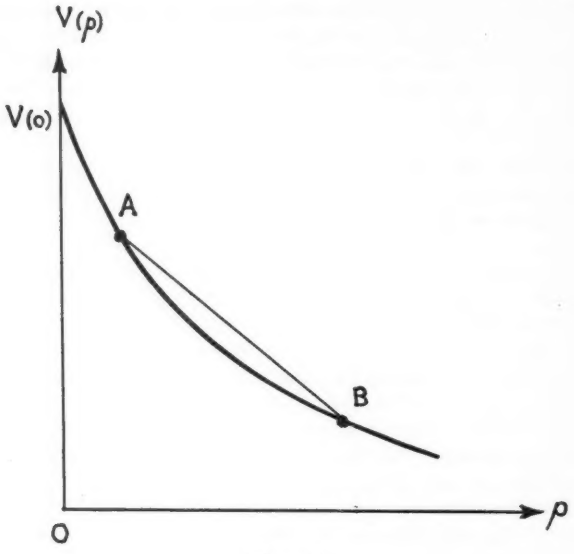


Figure 1

III

The Marshallian price-elasticity of this demand law is easily ascertained:

$$(5) \qquad \epsilon = \begin{cases} -\dfrac{dV}{V}\Big/\dfrac{dp}{p} = -\dfrac{dV}{V}\Big/d\rho = -\dfrac{d\log V}{d\rho} \\ = \displaystyle\int_0^\infty te^{-\rho t}\phi dt \Big/ \int_0^\infty e^{-\rho t}\phi dt, \end{cases}$$

and the interesting observation emerges that this elasticity is a weighted average of times, the shifting weights being the functions $e^{-\rho t}\phi(t)$. Hence ϵ has itself the dimension of time; it is a period. But the reader should not hastily jump to the conclusion that it is *the* average period Böhm Bawerk and Wicksell have been talking about.

With the strongest possible emphasis I wish to point out that this function $\epsilon(\rho)$ is not their average period, and that disregard of this fact is the main root from which endless confusion about the significance of the period concept and its use have originated. An

average period in the strict sense must be defined as an average of the values which $\epsilon(\rho)$ assumes over a certain range of interest rates:

$$(6) \qquad \bar{\epsilon}(\rho_A, \rho_B) = \frac{1}{\rho_B - \rho_A}\int_{\rho_A}^{\rho_B} \epsilon(x)\,dx.$$

The choice of this range, *i.e.* the numerical values allotted to the limits of integration ρ_A and ρ_B are arbitrary in the sense that they can only be determined by considerations of expediency.

For reasons that will become clear in a moment, Wicksell has selected as lower limit the fixed value $\rho_A = 0$, whereas the upper limit is at first left indefinite: $\rho_B = \rho$. This choice of boundaries leaves $\bar{\epsilon}$ a function dependent on ρ:

$$(7) \qquad \bar{\epsilon}_W(0, \rho) = \frac{1}{\rho}\int_0^{\rho} \epsilon(x)\,dx = \frac{\log V(0) - \log V(\rho)}{\rho}$$

And this function defines Wicksell's average period. The formula

$$(8) \qquad V(\rho) = V(0)e^{-\int_0^{\rho} \epsilon(x)\,dx} = V(0)e^{-\rho\bar{\epsilon}_W(0,\rho)}$$

follows at once. It constitutes the hard core of Wicksell's arguments.

IV

It is easy to see how confusion could arise over this matter. There is one special case in which ϵ and $\bar{\epsilon}_W$ are identical. And unfortunate historical circumstances and poor expositions have brought it to pass that discussions have been focused almost entirely on this exception to the neglect of the general case.

If $\epsilon(\rho)$ is constant for all values of ρ, including $\rho = 0$, then, and then only, does one obtain from (5) the relation

$$(9) \qquad \epsilon(\rho) = \epsilon(0) = \int_0^{\infty} t\phi\,dt \Big/ \int_0^{\infty} \phi\,dt = \bar{\epsilon}_W(0, \rho) = \mu'_1$$

so that the average period becomes *eo ipso* numerically definite, assuming the value of the first moment μ'_1, or the mean of the distribution $\phi(t)\,dt$.

Let us dispose of this tiresome exception once and for all. It may arise in two ways. The first is illustrated by the time-worn and tedious examples of growing trees and self-maturing wine. Here the distribution of the expected income-stream is statistically degenerate. There is only one single impulse, ϕ, at the time of maturity of the product, and naturally the date of maturity coincides with the mean μ'_1 of this peculiar "distribution"—which, in fact, can receive such a dignified title only by courtesy as it has no dispersion, no asymmetry, no kurtosis, no character whatever that is of the slightest

statistical interest. All its moments, $\mu'_\nu \equiv 0$, except the first $\mu'_1 \neq 0$. In equation (8) we have thus indeed $\bar{\epsilon}_W = \mu'_1$, but the formula is trite.

The second, slightly more interesting, case is the situation usually discussed by Böhm Bawerk. Here a genuine time distribution of an expected income-stream is envisaged, but the stream is assumed to be of such short duration, and subject to such low rates of discount, that no serious error arises, if $\epsilon(\rho)$ is *approximated* by $\epsilon(0)$. Here, then, the formula

$$(10) \qquad V(\rho) \simeq V(0)e^{-\rho\mu'_1}$$

is a valid approximation, but the conditions of applicability are so extremely restrictive that it is almost useless for practical purposes.

Still, it is a legitimate formula, and inspection of Fig. 2 will enlighten the reader as to its geometrical meaning. The dotted line in this figure is the tangent which touches the curve $\log V(\rho)$ in the origin. Its equation $\log V(\rho) \simeq \log V(0) - \rho\mu'_1$ is the same as (10). It will be realized that we have simply approximated the structurally somewhat complicated demand law $V(\rho)$ by means of a demand curve of constant elasticity. Naturally, this is a matter of great convenience, and mathematically a perfectly valid procedure. Approximations of this kind are not altogether unknown in other parts of Economics. However, the figure shows clearly the limitations of the technique: useful results can be obtained only for very small rates of interest.

By an historical misfortune, the attention of economists has been focused almost entirely on the exceptional case. It is not surprising, therefore, that many critics have been misled to conclude that the

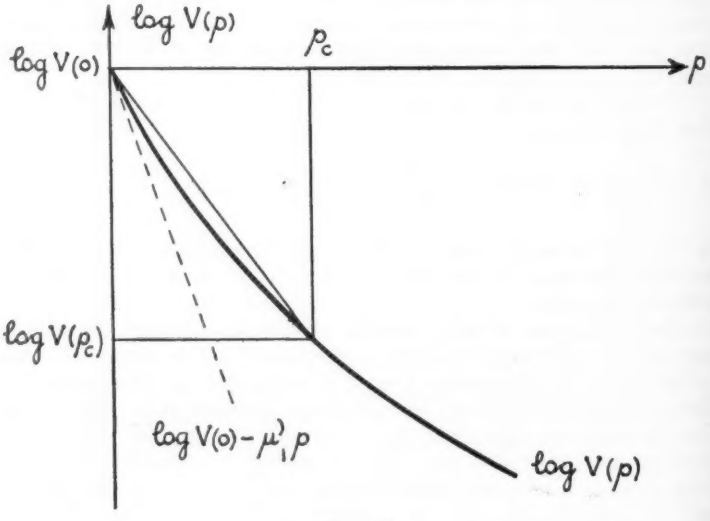


Figure 2

Böhm Bawerk-Wicksell theory is insufferably pompous, setting mountains in labour merely to produce two ridiculous little mice.

V

Inasmuch as the general case has attracted any attention, the majority of economists seem to consider nowadays that it is also useless. The average period, they argue, is a function dependent on ρ; but Wicksell and Böhm Bawerk want it for purposes which would require that it should have a fixed numerical value.

This opinion needs to be challenged. The argument is doubtless correct up to a point, but it does not prove what it is meant to prove. Wicksell does, in fact, secure a definite value for his $\bar{\epsilon}_W$, though one must admit that his exposition leaves much to be desired.

In substance, however, his procedure amounts to the following: By confronting the demand for an investment with its assumed costs he finds the internal rate of return, and this rate, substituted in (7), gives ϵ_W that definite numerical value which is needed. Suppose the investment were purchased at a price, C, assumed to be given, then there exists one rate of interest, ρ_c, which makes the value of the investment equal to its costs:

$$(11) \qquad C = V(\rho_c) = V(0)e^{-\rho_c \bar{\epsilon}_W(0,\rho_c)}$$

By division of (8) and (11) we obtain

$$(12) \qquad \frac{V(\rho)}{C} = \begin{cases} e^{\rho_c \bar{\epsilon}_W(0,\rho_c) - \rho \bar{\epsilon}_W(0,\rho)} = \\ e^{(\rho_c - \rho)\bar{\epsilon}_W(0,\rho_c) + \rho[\bar{\epsilon}_W(0,\rho_c) - \bar{\epsilon}_W(0,\rho)]} \end{cases}$$

Obviously it would be very convenient if we could suppress now the second term in the exponent on the right hand side. But is one entitled to assume that ρ[''] will be small by comparison with the other term? Of course, one is entitled to such an obvious approximation!

By the first mean value theorem of the integral calculus the content of the square bracket is equal to $\epsilon(\xi_1) - \epsilon(\xi_2)$ where ξ_1 and ξ_2 are values within the intervals $0 < \xi_1 < \rho_c$ and $0 < \xi_2 < \rho$. The nearer ρ approaches ρ_c, the closer will be the proximity of ξ_1 and ξ_2. The difference $\epsilon(\xi_1) - \epsilon(\xi_2)$, therefore, is presumably small, and multiplication by a small fraction ρ will make it still smaller.

Thus, by the use of this approximation, Wicksell secures once more a constant elasticity substitute for the demand law:

$$(13) \qquad V(\rho) \simeq V(0)e^{-\rho \bar{\epsilon}_W(0,\rho_c)}$$

which, but for the different numerical value given to the period, is completely equivalent to Böhm Bawerk's formula (10).

In terms of Fig. 2 it means that the arc of the curve $\log V(\rho)$, suspended by the points $(0, \log V(0))$ and $(\rho_c, \log V(\rho_c))$ has been approximated by the corresponding chord. As the curve is convex

this yields a closer approximation than that of Böhm Bawerk. It can be used over a wide range of interest rates and is thus not tied to the awkward restrictions that hamper severely the application of the earlier formula.

VI

Various useful operating concepts which Böhm Bawerk tried to secure for his theory follow with characteristic Austrian elegance.

$$(14) \qquad \frac{V(0)}{C} \simeq e^{\rho_c \bar{\epsilon}}$$

quantifies, so to speak, the general level of expectations raised by the investment prospect, whereas

$$(15) \qquad V(\rho) \simeq Ce^{(\rho_c - \rho)\bar{\epsilon}}$$

may be taken to describe the fate of the actual investment of C under a regime of continuously changing interest rates.

$$(16) \qquad V(0) - C \simeq C\left[e^{\rho_c \bar{\epsilon}} - 1\right] = \int_0^{\bar{\epsilon}} (\rho_c C) e^{\rho_c t}\, dt$$

may be interpreted as the goodwill which an entrepreneur acquires by using a borrowed capital, C, better than the "market" could do it, *i.e.* by obtaining an interest rate ρ_c above the market level ρ. And his rate of turnover appears as the ratio of yearly income to owned capital:

$$(17) \qquad \frac{\rho_c C}{V(0) - C} \simeq \frac{\rho_c}{e^{\rho_c \bar{\epsilon}} - 1} \simeq \frac{1}{\bar{\epsilon}}.$$

In the approximation of simple interest the rate of turnover is the reciprocal of the period.

The reader should note that the derivation of these useful relations is quite independent of the numerical value assigned to the average period.

VII

It could be argued that it is unrealistic simply to assume costs as a datum, independent of the rate of interest. Typically costs are a series of planned payments distributed over time, so that they can be described only by some law $C(\rho)$ of their discounted value.

All this is doubtless true, but it does not make any difference to the structure of the theory. An equation

$$(18) \qquad V(\rho) - C(\rho) = 0$$

confronting income and costs, would yield values for the internal rate of returns ρ_c just as well as (11) did. Yet it has been maintained that there might then be many places of zero and that consequently the internal rate of return turns out to be an "ambiguous concept".

To explore the nature of the alleged ambiguity we shall assume that the equation (18) really has n positive places of

zero: $\rho_1 < \rho_2 < \ldots < \rho_n$. Then, according as to whether n is even ($n = 2\nu$), or odd ($n = 2\nu + 1$), there will be ν, or $\nu + 1$, intervals for which the investment is profitable, and ν intervals for which this is not the case. The curve $\log V(\rho)$ appears to be dissected by these intervals into alternating profitable and non-profitable bits. But within each profitable segment, ϵ assumes a characteristic average value $\bar{\epsilon}$, which is obtained from (6) by putting successively

$$\rho_A = 0,\ \rho_2,\ \rho_4,\ \ldots\ \text{and}\ \rho_B = \rho_1, \rho_3, \rho_5, \ldots = \rho_C.$$

Thus for each profitable interval the appropriate constant elasticity approximation

$$V(\rho) = \text{constant}\ e^{-\rho\bar{\epsilon}} \tag{19}$$

may be readily obtained, and one would like to know where the alleged ambiguity is supposed to arise. Different sections of the curve, naturally, will have different average slopes. Or, to put the matter differently: why should one be compelled to assume that a measure of the level of expectations such as

$$\frac{V(\rho_A)}{V(\rho_C)} \simeq e^{(\rho_C - \rho_A)\bar{\epsilon}} \tag{20}$$

is admissible only when it is single-valued? Are expectations not modified according to the levels of the interest rate which are thought to be relevant?

To counter the charge of ambiguity it has been said in an earlier discussion that the case of multiple roots is more in the nature of a curiosity and has little practical importance. That may well be so, multiple zeros may be exceedingly rare. Yet, why should one not dream of unsuspected possibilities of earning large rates of return in very short times? The internal consistency of the calculus of compound interest is not thereby endangered.

VIII

Of greater weight and consequence is the critique of the classical real cost approach which F. H. Knight has voiced with particular forcefulness. He points out correctly that it is not common business procedure to quantify expectations by comparing the costs C of an investment, with the sum $V(0)$ of its undiscounted values, after the fashion of formula (14). The relevant comparison is made by considering the ratio of income derived from an "equivalent perpetuity" and the opportunity costs of the investment. As I understand it, this pertinent observation demolishes effectively the facile assumption that the whole range of the curves $V(\rho)$ and $C(\rho)$ may be taken as describing the "rational" reaction pattern of an investor. The possibility of purchasing perpetuities necessarily enters into, and decisively alters, the picture. Cf. Fig. 3.

If ρ_o is the log of expected long term rate of interest, then the size of a perpetuity equivalent to $V(\rho_o)$ is $\rho_o V(\rho_o)$, and

$$P(\rho) = \frac{\rho_o V(\rho_o)}{\rho} \tag{21}$$

is the law of value of this perpetuity. The figure now shows at a glance that the arc $\overset{\frown}{V(0), V(\rho_0)}$ is quite irrelevant for the investor's decision, because for all rates $\rho < \rho_0$ the perpetuity is more profitable. Similarly the arc $\overset{\frown}{C(0), C(\rho_1)}$—where ρ_1 is the root of $P(\rho)—C(\rho)=0$ —does not describe the opportunity costs which an investor has to incur in order to acquire the value stream ϕdt.

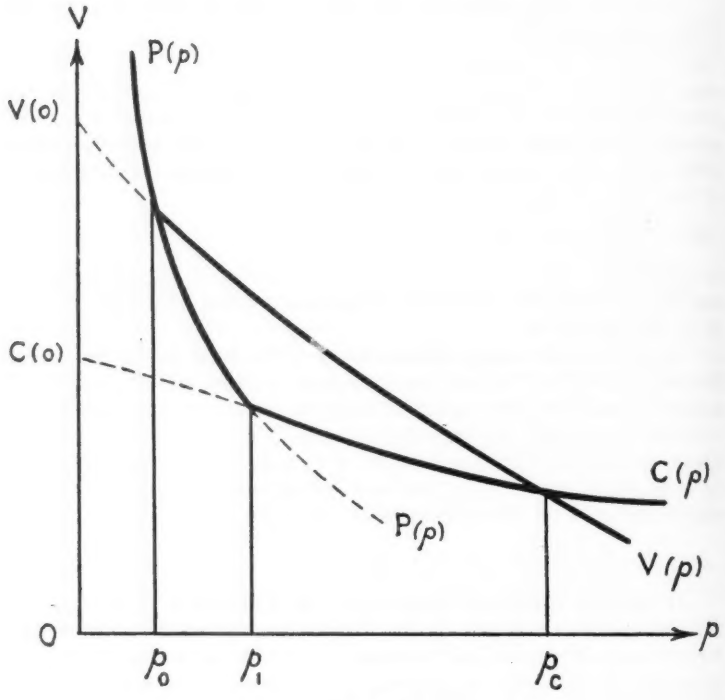


Figure 3

The relevant opportunity cost curve is seen to have a kink at $\rho = \rho_1$. It consists of two bits pieced together: the law $P(\rho)$ for all $\rho < \rho_1$, and the planned costs $C(\rho)$ for $\rho > \rho_1$ only. Böhm Bawerk and Wicksell had assumed somewhat loosely that the whole interval from 0 to ρ_c is profitable; in fact it is only the much smaller interval (ρ_0, ρ_c) that counts.

Far from demolishing the "period concept", however, this argument can only strengthen its precision as a measure. The shorter the chord that replaces the arc, the better will be a constant elasticity approximation. By writing formula (6) as

$$(22) \qquad \bar{\epsilon}_K(\rho_o, \rho_c) = \begin{cases} \dfrac{1}{\rho_c - \rho_o} \displaystyle\int_{\rho_o}^{\rho_c} \epsilon(x)\,dx = \\ \dfrac{1}{\rho_c - \rho_o} [\log V(\rho_o) - \log V(\rho_c)] \end{cases}$$

a much closer fit is obtained for the relevant range. I have inserted in the foregoing formula the letter "K" in order to honour Prof. Knight for his most valuable clarification.

IX

When the theory of a single investment has been tidied, the extension of its characteristic concepts to problems of markets, *i.e.* of interacting groups, is comparatively easy. We reckon investors to belong to the same group, if they aim at securing the same income stream $\phi(t)\,dt$. On the cost side, however, no uniformity will be stipulated. Full allowance is made for the existence of struggling marginal investors at the one, and for comfortably placed capitalists at the other, end of the scale.

Let such a group then consist of n persons, each of whom achieves his characteristic rate of return, according to luck, location, ability, in short, all those varied circumstances which single out some persons as captains of industry, and condemn others to struggle on the margin. Assume that these rates $\rho_1 \leqq \rho_2 \leqq \ldots \leqq \rho_n$ are known and can be entered as in Figure 4.

Again, it would seem desirable to simplify the description by approximating the law of value $V(\rho)$ which all members of the group —by definition—have in common. It will be evident from the figure

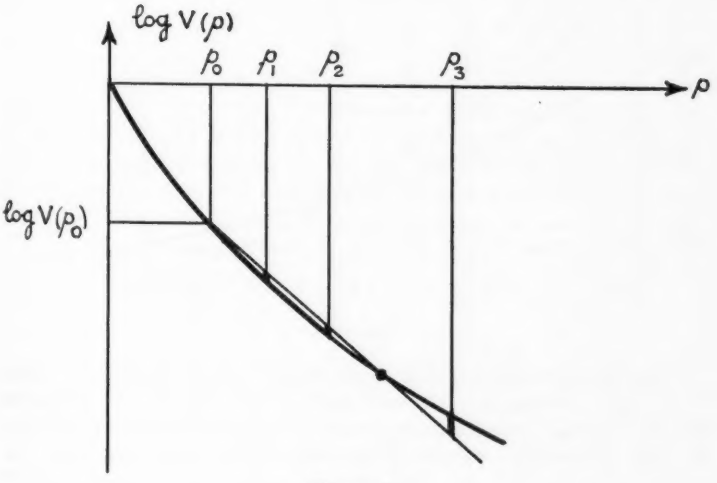


Figure 4

that the finding of an optimum value for the constant elasticity ϵ might be conceived of as a case for the method of least squares. In fact the postulate that

$$(23) \qquad \sum_{\nu=1}^{n} [\log V(\rho_\nu) - \log V(\rho_0) + (\rho_\nu - \rho_0)\bar{\epsilon}]^2$$

should be made a minimum by a suitable choice of ϵ, leads to an answer that is as plausible as it is satisfactory. Bearing in mind that by formula (22) an average period was determined for each member of the group, the postulate (23) may be reformulated as

$$(24) \qquad \sum_{\nu=1}^{n} [-(\rho_\nu - \rho_0)\bar{\epsilon_\nu} + (\rho_\nu - \rho_0)\bar{\epsilon_\nu}]^2 = \text{Minimum}$$

And now the obvious solution

$$(25) \qquad \bar{\epsilon} = \frac{\overline{\Sigma}\,(\rho_\nu - \rho_0)^2\bar{\epsilon_\nu}}{\overline{\Sigma}\,(\rho_\nu - \rho_0)^2}$$

is seen at once, though the weights of this average may perhaps cause a little surprise.

X

Having now gained the freedom of assigning an average period to a whole group of investors, it is no longer difficult to clarify the real meaning of Böhm Bawerk's hotly contested assertion that pressure of competition will result in a search for longer and longer roundabout ways of production.

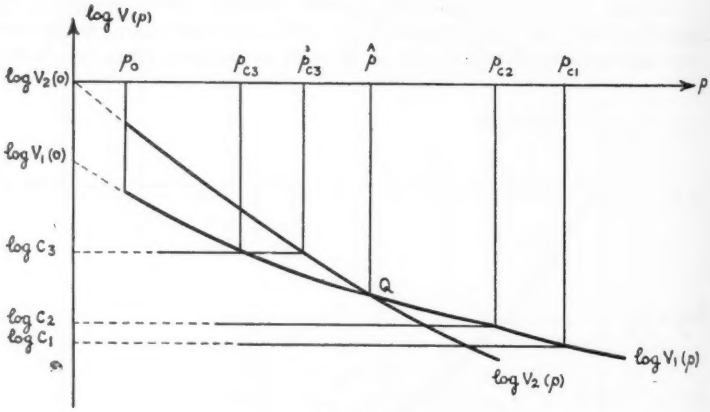


Figure 5

Let there be two methods of production which yield the prospective income streams $\phi_1(t)dt$ and $\phi_2(t)dt$ respectively. We stipulate that the Laplace transforms of these time distributions, *i.e.* the laws of their discounted values $V_1(\rho)$ and $V_2(\rho)$ are such that (a) $V_2(0) > V_1(0)$, and (b) that from a certain value $\rho = \hat{\rho}$ upwards

the condition $V_2(\rho) < V_1(\rho)$ holds, so that the two curves have a point Q in common. The cost structures of three representative firms have also been entered into the figure. (For simplicity I have taken costs to be independent of the rate of interest, but that makes no difference, as was explained in section VII above.)

It will be clear from the figure that the firms labelled "1" and "2" respectively will have to select the first technical process as the appropriate method for their maximising problem. The firm labelled "3", however, will achieve a higher rate of return ($\rho'_{C3} > \rho_{C3}$) by adopting the other technical method. The critical level is indicated in Figure 5 by the point Q of intersection.

If we assume now that growing competition for scarce factors of production will gradually raise the costs of all firms in relation to the expected returns, then—as the critical level Q is passed—more and more firms will be compelled to alter their method of production. But by (25) specific, numerically determinate average periods have been allotted to the relevant sections of the curves $V_1(\rho)$ and $V_2(\rho)$. There cannot be the slightest doubt that by these measures the second technical process will appear more round-about.

Böhm Bawerk's famous law thus turns out to be not an empirical proposition based on inductive studies, but as a modest proposition valid within the framework of his model. It is a simple geometrical assertion about the points of intersection in the figure, fairly trite, but true. Bearing in mind that average periods are elasticities, Böhm Bawerk's assertion might be reformulated as follows: Favourable expectations will at first induce entrepreneurs to cream off the less elastic methods of production, but as pressure of competition will gradually reduce the ratios of prospective incomes to costs, a search for more elastic methods will become imperative. And then it is rather difficult to understand what all the furious controversy was about.

XI

It remains to direct the reader's attention to some well-known 19th century developments of mathematics which might provide him, for purposes of computation, with a set of tools that is as flexible and versatile as it could possibly be desired. The formula (3) which was the starting point of our investigation admits the following elegant development:

$$
(26)\qquad \left\{\begin{aligned}
V(\rho) &= \int_0^\infty e^{-\rho t}\phi\,dt = \int_0^\infty \Big[1-\rho t+\frac{\rho^2}{2!}t^2-\ldots\Big]\phi\,dt \\
&= \int_0^\infty \phi\,dt.\Big[1-\rho\,\frac{\int t\phi\,dt}{\int \phi\,dt}+\frac{\rho^2}{2!}\,\frac{\int t^2\phi\,dt}{\int \phi\,dt}-\ldots\Big]_0^\infty \\
&= V(0)\left[1-\rho\,\mu'_1+\frac{\rho^2}{2!}\mu'_2-\ldots\right]
\end{aligned}\right.
$$

where the μ'_ν are the well-known moments of the time-distribution $\phi(t)dt$. As all human efforts are finite in size and in duration, no problem of existence of moments arises as far as real investments are concerned, and fictions such as perpetual rents are easily handled separately.

But one can go one step further. In modern Statistics it is common practice not to rely on moments as characteristic measures of frequency distributions, but to use the more effective cumulants or semi-invariants. Every reasonable textbook will explain how these two sets of measures are related. As an example I give here the first three formulae:

$$(27) \qquad \begin{cases} \kappa_1 = \mu'_1 \qquad \kappa_2 = \mu'_2 - (\mu'_1)^2 \\ \kappa_3 = \mu'_3 - 3\mu'_2\mu'_1 + 2(\mu'_1)^3 \\ \cdot \quad \cdot \quad \cdot \quad \cdot \quad \cdot \quad \cdot \quad \cdot \quad \cdot \quad \cdot \quad \cdot \quad \cdot \quad \cdot \quad \cdot \end{cases}$$

By means of these well-known transformations the equation (26) emerges more effectively as

$$(28) \qquad V(\rho) = V(0)e^{-\rho\kappa_1 + \frac{\rho^2}{2!}\kappa_2 - \frac{\rho^3}{3!}\kappa_3 + \cdots}$$

which shows that the "marginal efficiency" of a prospective investment is simply a demand law of a type that ought to be familiar to economists since the work of H. L. Moore.

Differentiation of (28) yields

$$(29) \qquad \epsilon(\rho) = \kappa_1 - \rho\kappa_2 + \frac{\rho^2}{2!}\kappa_3 - \cdots$$

which obviously is more convenient than (5) for practical work. And similar expressions follow with natural ease for each formula that has been used above.

Thus the theory is completely independent of any specific assumption about the shape of the income or cost streams that are envisaged. These streams need not be smoothly rectangular, nor triangular, nor degenerate, to name the types most frequently discussed in the literature. For all we know of practical cases, they may well bristle like anguished hedgehogs.

Vice versa, if empirical investigation has yielded some interpolation of the form

$$(30) \qquad \epsilon(\rho) = a + b\rho + c\rho^2 + \cdots$$

then there is no difficulty in inferring what the corresponding time distribution looks like. Reasonable textbooks of Statistics and of the Calculus of Probabilities will enlighten the reader about various standard methods available for this purpose.

XII

It would appear, then, that the controversial matter in the historic debates on capital and interest is primarily a question of selecting and of interpreting suitably flexible formulae which approxi-

mate the demand curve for a given type of investment. The fierce clash between the Austrian and the Knightean version can be reduced to this one issue only, and it would seem that the confrontation of demand curves with assumed cost conditions raises merely secondary problems which easily take care of themselves.

Consider the possibility of obtaining for an arbitrary interval of interest rates $(\rho'-h', \rho'+h')$ a simple approximation for

$$V(\rho) = V(0)e^{-\int_0^{\rho}\epsilon(x)dx} \tag{31}$$

where $\epsilon(x)$ is the function (29) determined by the cumulants of the prospective income stream. Putting $\rho = \rho' + h$ one has

$$V(\rho) = \left(V(0)e^{-\int_0^{\rho}\epsilon(x)dx}\right) \cdot e^{-\int_{\rho'}^{\rho'+h}\epsilon dx} \tag{32}$$

$$= V(\rho')e^{-h\epsilon(\rho')+ \ldots .}$$

and one can restrict consideration to the linear term in the exponent provided that $|h|<h'$ is kept reasonably small. Now the Austrian period provides a short cut which saves the exacting labour of computing the cumulants as required by (29). We define

$$\bar{\epsilon}(\rho') = \frac{1}{2h'}e^{\int_{\rho'-h'}^{\rho'+h'}\epsilon(x)dx} = \frac{1}{2h'}\log\frac{V(\rho'-h')}{V(\rho'+h')} \tag{33}$$

and take this figure as an estimate for the required value of $\epsilon(\rho')$ in (32). Note that this estimate can be made as accurate as we like because $\lim_{h'\to 0}\bar{\epsilon}(\rho') = \epsilon(\rho')$.

Thus the formula

$$\bar{V}_1(\rho) = V(\rho')e^{-(\rho-\rho')\bar{\epsilon}} \tag{34}$$

is obtained which is a curve of constant elasticity. If we now consider that the approximation

$$V(\rho')e^{\rho'\bar{\epsilon}} \simeq V(0) \tag{35}$$

remains within the limits of precision to which we aspire, then (34) can be developed as

$$\bar{V}_1(\rho) = V(0)e^{-\rho\bar{\epsilon}} \simeq V(0)(1-\rho\bar{\epsilon}) \text{ etc.} \tag{36}$$

and we have once more the typical formulae with which the Austrians operate.

But we may equally well re-write (34) as

$$\bar{V}_2(\rho) = \frac{V(\rho')}{1+(\rho-\rho')\bar{\epsilon}} = \frac{C}{\frac{1}{K}+\rho} \tag{37}$$

using $C = \frac{1}{\bar{\epsilon}}V(\rho')$ as a measure of the intensity of the expected

income stream, and $K = \bar{\epsilon}/(1 - \rho'\bar{\epsilon})$ as a measure of its time dimension.

Now one can, if one likes, read (37) in the Knightean fashion as a perpetuity discounted at a "true rate" $\rho + \frac{1}{K}$, i.e., a rate which makes allowance for depreciation. As $\bar{V}_2 = C\int_0^\infty e^{-\rho t} e^{-\frac{1}{K}t}\, dt$, (37) can be construed as the present value of the decaying income stream $ce^{-\frac{1}{K}t}$ which only for $K \to \infty$ becomes a perpetuity in the strict sense. But this interpretation cannot be taken as an elimination of the Austrian period concept. Professor Knight has merely hidden it under the blanket terms "provision for depreciation", "maintenance of capital", etc.

The formula (37) can equally well be read in the Austrian fashion. One merely has to accept ck as a reasonable approximation of V(0) and use the parameter k rather than $\bar{\epsilon}$ as a measure of the average period.

A comparison of (34) and (37) shows, however, that the second formula allows a greater latitude with respect to the possible range of interpolation. The assumption of constant elasticity in (34) is severely restrictive. By contrast the elasticity of (37) turns out to be

$$(38) \qquad \eta(\rho) = -\frac{d\bar{V}_2}{d\rho} \Big/ \bar{V}_2 = \frac{1}{\frac{1}{K} + \rho}$$

and this hypothesis obviously gives a better approximation of the true elasticity $\epsilon(\rho)$ as described by (29). In logarithmic plotting $\bar{V}_1(\rho)$ appears as a straight line, $\bar{V}_2(\rho)$ as an osculating curve. It is its analytical simplicity that makes (37) the superior formula; whether we read it in the Knightean or in the Austrian fashion would seem to be largely irrelevant.

H. BERNARDELLI

University of Otago.

PROTECTION OF THE AUSTRALIAN DAIRYING INDUSTRY*

1. We have been asked by the Dairy Industry Committee of Enquiry to submit comments on the economic condition of the industry. We have confined these comments largely to the problem of the level of protection being given to the industry through the subsidy and the home price scheme. We have examined the question from a purely economic point of view, with no attention being given to social, political and cultural aspects. The Committee has had ample advice, and will have views of its own, on these wider matters.

2. The dairying industry enjoys protection on butter and cheese production in two main forms. It receives, from Australian taxpayers, a direct subsidy paid out of Commonwealth Government revenues; and it charges Australian consumers prices in excess of the world price. This home price is protected by the tariff on dairy products and by import controls. The tendency it might have to price dairy products out of the market is inhibited by the quotas imposed on the production of margarine and by limitations on its quality.

3. The industry has played and is playing an important role in Australia's settlement and development. In being a recipient of protection, it is no different in kind from many other Australian industries.

4. It is, in this respect however, notably different from Australia's other major rural export industries which receive little or no protection from Australian consumers and taxpayers. The dairying industry has received substantial protection and, in 1956-57 and 1957-58, received a very high level of protection. In 1958-59 and, so far, in 1959-60, the level of protection has been rather lower, owing to the high world price for dairy products. (See paras. 29-33 below.) Most experts appear to believe, however, that if the present system of protection continues, the total amounts received by the industry, by way of home price in excess of world price and direct subsidy, will again become and remain large.

5. It should be emphasized that protection in the form of a home price in excess of the world price is just as burdensome as protection in the form of a direct subsidy. Indeed, if we look at the effects of the two forms of protection, a home price in excess of world price is, at least from a social point of view, more burdensome than a subsidy. A subsidy is paid by all taxpayers according to their capacity to pay. A home price in excess of world price is paid by consumers of butter and cheese according to the amount they consume. It falls most heavily on low income recipients who spend a relatively large part of their incomes on basic foods, including butter and cheese. It falls particularly heavily on the poor generally, on age pensioners,

*This article reproduces a report made by the authors to the Commonwealth Dairy Industry Committee of Enquiry and dated 28th December, 1959.

on large families. It should be noted that New Zealand actually subsidises home consumed butter to reduce its home price *below* world price.

6. The industry's special difficulties arise from the fact that it is a relatively labour-intensive industry operating in a country where labour is relatively dear and competing in a world market against more efficient producers and against countries in which labour is relatively cheaper. It nevertheless attracts a large, even a growing, number of producers both because it has been protected against outside competition for many years, and because the capital required to make a start in the industry is small, and returns are received regularly and frequently, instead of at yearly intervals as in most other rural industries. In dairying, moreover, while a lot of labour is required, some of it is supplied by wives and children of dairymen. The productive efforts of dependent families are not much used in other industries. The dairying industry is thus able to get some "cheap" labour even in a country where labour is normally dear.

7. A further special difficulty arises from the fact that for the industry's main product, butter, there is available a close, high-quality substitute in the form of margarine. The production of margarine relies on the use of relatively cheap materials and on highly capitalised efficient processing methods. It can therefore be produced cheaply even in a country like Australia where labour is relatively dear.

8. In seems very likely that world demand for edible fats will increasingly be supplied either by the cheap products of highly capitalised and efficient margarine factories, or by butter produced in countries where either labour is relatively cheap, or productivity is sufficiently high to offset the high labour content of the natural product.

9. If Australia ignores this probable long-term trend, and seeks to supply her domestic market for edible fats mainly from home-produced butter and, in addition, to export considerable quantities, she is likely to be faced with a large and rising burden of protection for the industry.

10. There are three main reasons which we believe point to the desirability of some reduction of the level of protection afforded to the dairying industry. First, some resources at present engaged in dairying would be more productive if employed elsewhere, and their shift would raise the average level of productivity of the economy. Secondly, as a country whose main export income is earned by rural industries, we must be concerned with the allocation of resources to an industry like dairying, which competes for its resources, directly and indirectly, mainly with rural industries. Resources go into dairying largely at the expense of other rural industries. If the world is willing to pay us a profitable price for other rural exports, and

an unremunerative price for dairy products, then we should be ill-advised to keep an undue proportion of our resources in dairying by giving it an undue level of protection. Thirdly, the burden on consumers and taxpayers of protecting dairying has in recent years become extremely heavy.

11. On the other hand, because dairying is more labour-intensive than other rural industries, a contraction of dairying production might require an expansion of protected and sheltered production in order to absorb some of the labour released. Moreover, not all the land now used for dairying is suitable for use in unprotected and unsheltered export industries. Some of it, too, might have to go into uses where it needed protection. We conclude, therefore, that some measure of protection can properly be given to the dairying industry. But dairying does differ from those secondary industries to which protection is most often granted. It is unlikely to become viable, in the long run, without protection. Its efficiency is not held back by the limited extent of the internal market. It is not an increasing returns industry. We conclude that any protection afforded dairying should be below the average level of protection enjoyed by protected industries.

12. Over the past six or seven years, about one-third of butter production has been exported. Any reduction in the protection afforded the dairying industry would tend to cause exports to fall, both absolutely and relatively, to the extent to which production was contracted and local consumption stimulated. Nevertheless, we are likely to remain a net exporter of dairy products for at least some time, although it is by no means wholly unlikely that the time will come when production just about balances local consumption, so that ultimately we may sometimes be a net exporter and sometimes a net importer, according to seasonal conditions.

13. In the absence of any protection at all to the dairying industry, if we are net exporters, the price of dairy products in Australia (and the return to producers) would be the U.K. price less freight and other charges involved in transporting the products to the U.K. This we describe as "export parity". On the other hand, if we become net importers, we would presumably obtain supplies from New Zealand, which is our near neighbour and an efficient dairy producer. The price would presumably be the N.Z. export price plus freight and other charges to Australia. This we describe as "import parity". The N.Z. export price is at present the U.K. price less freight and other charges from N.Z. to the U.K. We understand that freight and other charges between Australia and the U.K., New Zealand and the U.K., and New Zealand and Australia are about the same. Australian import parity for N.Z. butter could therefore be about the U.K. price. In fact, since supplies of butter to Australia other than from New Zealand would probably be at somewhat higher prices, we might have to negotiate with New Zealand for bulk supplies

at prices rather above the U.K. price. The margin between export and import parity seems likely to be about 50/- to 60/- per cwt., which, at a U.K. price of 375/- per cwt., represents about 15% to 18% on export parity of 325/-, and at a U.K. price of 500/- per cwt. about 11% to 13% on export parity of 450/-. (All prices in Australian currency.)

14. For the reasons given in paras. 10 and 11 above, we believe that the degree of protection afforded the dairying industry should be substantially reduced. This should be done by abolishing the subsidy on butter and cheese production, by removing tariffs and import controls on butter and cheese, and by lifting restrictions on the quantity and quality of margarine produced, whilst at the same time affording the industry a limited amount of protection by permitting it to fix a home price above export parity (but necessarily below import parity) and by imposing an excise of limited magnitude on the production of margarine.

15. These suggestions involve a continuation of the system of equalization between home price and export parity, but the home price will not be able to rise beyond import parity. As indicated above (see para. 13), import parity is likely to be about 50/- to 60/- per cwt. above export parity. This margin depends primarily on the costs of transportation between Australia and overseas countries and will tend to vary with the general level of prices, but not with the prices of butter and cheese themselves. Thus, so long as the dairying industry remains a net exporter, it will be given a measure of protection which will tend to rise with rises in general costs, and which will not be affected by fluctuations in the world prices of butter and cheese. If Australia were to become a net importer, the industry would continue to enjoy a measure of natural protection to the same extent. With a U.K. price of butter of about 300/- (sterling) or 375/- (Australian) per cwt., the protection to the industry would be of the order of 15% to 18% on the corresponding export parity of about 260/- (sterling) or 315/- (Australian). This we judge to satisfy our criterion (see para. 11) that protection given to the dairying industry should be rather below the average level of protection enjoyed by protected industries.

16. However, the extent to which this protection will be effective will depend on the competitive position of butter *vis-a-vis* margarine, which will now be freed from all restrictions on its production. In order to afford butter some protection against margarine, we believe that, so long as we are net exporters of butter, it would be appropriate to impose an excise on margarine equal to about the level of protection enjoyed by butter over its export parity, namely about 50/- per cwt. This would place margarine in the same competitive relation to butter as if the butter market were wholly freed and butter were selling at export parity.

17. Under the conditions set out in the two preceding paragraphs, the dairying industry would determine the home price of butter within the range of export to import parity, so as to maximize its revenues, and would then equalize returns as between sales on the home market at this price and exports at export parity. Whether or not the most profitable home price would be at import parity would, of course, depend on the elasticity of demand for butter in response to price changes, but in view of the suggested protection against margarine, it seems likely that in fact the most profitable home price would be at import parity.

18. It should be noted in passing that we have not considered specifically the issue of dairying income-stabilization as distinct from the issue of income-protection. It may be desirable for the Commonwealth Dairy Produce Equalization Committee to establish its own stabilization fund whereby the return to producers was increased in years when export-parity was low and was reduced in years when export-parity was high, provided that the fund was self-supporting. The price to consumers should continue to fluctuate with the world price, in order to encourage butter consumption when prices were low, and to discourage it when prices were high.

19. At present the world price is rather high, since European drought conditions have reduced supplies of dairy products. If, as is expected, these prices fall substantially over the next few years, the immediate adoption of our suggestions would cause distress and confusion in the dairying industry in Australia. Sudden changes should be avoided. We therefore believe that the changes should be introduced gradually, over a transition period of five to ten years. This would give an opportunity to adjust methods and scale of production in an orderly fashion.

20. During this transition period, a detailed investigation should be undertaken designed to produce recommendations for the rehabilitation of the industry. The present system of protection gives benefits to all dairy farmers, rich and poor alike. As a result, some are receiving very high incomes; others are receiving incomes which, despite protection, are still inadequate as a return on their capital and for their labour and that of their families. We have suggested that this overall type of protection should be reduced. However, special assistance should be available to several types of dairy farmers, in order that the whole industry may be established on a sound basis, and special protection be given to those most in need of it.

21. To this end, we believe that funds should be made available:

(*a*) to rehabilitate and raise the efficiency of dairy farmers who can, with technical assistance and capital loans on advantageous terms, expect profitably to continue in dairying with the reduced amount of protection;

(*b*) to assist the departure from the industry of those who have no such expectation—perhaps by capital grants or loans to compensate for capital losses and to help establish them in new economic activities where they can expect to succeed; and

(*c*) to establish a limited system of special subsidies for those few farmers who cannot or will not come under (*a*) or (*b*) above, framed to give them a minimum income provided they fulfil minimum standards of productivity. It is not envisaged that many dairymen should come into this category. The special subsidies would, of course, be available only to people already in the dairying industry, and would cease on the death or retirement of the individual dairymen who had been receiving them. Consideration might, however, be given to helping their heirs to move into category (*a*) or (*b*) above.

22. A particular problem arises over land values. In some areas, the present system of protecting the dairying industry has permitted large profits to be earned from dairying, and some of these will have been capitalized into land values. Since there has always been some uncertainty about the size and permanence of protection to the industry, we do not believe that the expected income from protection would be worth many years' purchase. Any farmer who bought his land some time ago would, in the first place, have enjoyed the benefits of protection for that time and, in the second, have benefited from the general inflation of all values, including land, that has occurred in recent years. Moreover, we have suggested that a measure of protection for the industry generally can be justified. If this suggestion is adopted, the returns to the industry will continue to be supported, and to justify at least a substantial part of existing land values.

23. In some recent years, namely 1955-56, 1956-57 and 1957-58, the maintenance of the home price has probably prevented the slump in world price from having as much effect on land values as it would otherwise have had. If lower prices again prevail in the future, after the effects of the recent European drought have passed, there may, if the present system of protection is moderated, be some disappointment of the expectations on which land values have been based. This would affect particularly farmers who have bought land in the last four or five years. Much of this problem will be solved by making the reduction of protection gradual, spread over a transition period. There may, however, remain a residual problem which might have to be dealt with by special compensation for a limited number of dairymen who may be able to establish that they have not had time to recover capital laid out in anticipation of continuing protection. Such compensation should be paid, of course, only for the disappointment of legitimate expectations about protection. It should be paid only to those who have bought farms in the recent past artificially inflated by the prospect of continued protection; no compensation should be

paid merely because farmers had thought they were going to enjoy a windfall capital gain on the value of farms bought some time ago.

24. The suggestions contained in paras. 14 to 21 above, whilst resulting in a considerable reduction in the protection afforded the dairying industry, will still give the industry appreciable help. The modified home price scheme (para. 15) will give the industry protection worth approximately £7m. per annum, and the special assistance envisaged in para. 21 should involve further expenditure continuing for at least a decade.

25. A reorganization of the system of protection for the dairying industry along the lines suggested would lead to considerable benefits. The home price for butter will be reduced from levels which, taking one year with another, have been artificially high, to levels at or below the price which would obtain if we were net importers of butter, and the restrictions on the quantity and quality of margarine produced will disappear. The distortions which the present system of protection have imparted to consumer spending will accordingly be moderated and the losses of consumer satisfaction reduced. Moreover, the reduction of protection to butter and cheese producers is likely to lead to pressure from both dairy farmers and consumers in the market for whole and processed milk. It seems reasonable to assume that prices there would be reduced in sympathy with the prices of butter and cheese. This would be of considerable benefit to consumers.

26. More important, some dairy producers will move into other industries where they will produce goods and services worth more than the dairy products they have been producing valued at export parity, and the efficiency of others will be raised. This represents a gain of real income to the community.

27. Finally, under the modified system of protection suggested above, some transfer payments will still be made from the community as a whole to dairy farmers, as a result of the home price scheme and of special assistance in various forms. The transfer payments will, however, be less in total than they would be under the existing system of protection, and they will involve a much smaller tax burden. Moreover, the special assistance will be directed in such a way as to serve a more useful purpose. It will help to put the industry on a sound economic basis, it will help the establishment in other activities of some individuals who wish to leave the dairying industry, and it will help poor dairymen rather than the rich.

28. We consider below the present cost of protecting the dairying industry, and the various arguments that have been advanced to justify this protection.

The Amount of Protection Afforded to the Dairying Industry

Butter and Cheese

29. The following table attempts to estimate the amount of protection afforded to butter and cheese from subsidy and home price.

It is based on Schedules 1 and 2 in the *Twenty-fifth Annual Report* of Directors of the Commonwealth Dairy Produce Equalization Committee Ltd. The method is simply to value all production at export parity (in terms of the net return to manufacturers at agents' floors). Market realizations in excess of this figure are attributed to the home price in excess of export parity. In addition, producers receive a subsidy.[1]

Butter and Cheese—Returns to Manufacturers

	Value of Prodn. at Export Parity Realizations	Home Price in excess of Export Parity	Subsidy	Total Protection	Total Receipts of Producers	Protn. as % of Total Receipts	Protn. as % of Export Parity Value
	£Am.	£Am.	£Am.	£Am.	£Am.	%	%
1952-3	73·1	2·7	15·3	18·0	91·1	19·8	24·6
1953-4	73·1	0·7	15·6	16·3	89·4	18·2	22·3
1954-5	81·1	3·1	16·2	19·3	100·4	19·2	23·8
1955-6	82·4	10·0	14·6	24·6	107·0	22·9	29·7
1956-7	63·8	20·3	13·6	33·9	97·7	34·7	53·1
1957-8	45·7	28·2	13·4	41·6	87·3	47·7	91·0
1958-9	*	*	13·6	*	93·7	*	*

*Not available

30. It will be seen that total protection increased from about £18m. a year in the first three years of the table to £42m. by 1957-58. Over the six years 1952-53 to 1957-58, it totalled £154m. and averaged £25·6m. a year. Producers relied on protection for about 19% of their incomes in the early 'fifties, and for 48% in 1957-58. Over the whole period, protection provided about 27% of producers' incomes.

31. Both taxpayers and consumers have contributed substantially to total protection, but the proportion paid by Australian consumers, owing to the slump in world prices not being reflected in the home price, has grown sharply in the later years shown in the table. The proportion of protection paid by consumers has risen from about 12% in the first three years to 59% in the last three years and to 68% in 1957-58.

1. There has not been enough time to make final checks on these figures. We shall do this later. In any case, the figures should only be taken as illustrative of the burden of protecting the dairying industry. An accurate measure of the total absolute cost of protection is impossible. The method assumes that, in the absence of protection, Australia would have remained a net exporter of butter and cheese and that any reduction of her exports would not have caused any increase in the world prices of butter and cheese. If, without protection, Australia would have been a net importer of butter and cheese, then the estimates should be recalculated on the basis of import parity (see para. 13 above). If Australia's conversion from a net exporter to a net importer would have led to a higher world price, the estimates should be still further reduced.

32. Perhaps the most significant fact is the rise of total protection from 23·6% of export parity values in the first three years to 53·1% in 1956-57 and 91·0% in 1957-58. Over the whole six-year period it averaged about 41%.

33. For 1958-59, and for the first six months of 1959-60, available information suggests that, with the drought-induced rise in the world price of dairy products, the position is back to something like the average for the six years 1952-53 to 1957-58. Producers appear currently to be drawing about 27% of their incomes from protection, which is adding about 37% to export parity values of about £67m. Total protection is of the order of £25m. per annum, £13·6m. from subsidy and the rest from the excess of home price over export parity.

Fluid and Processed Milk

34. Fluid milk prices are inevitably relatively high because of the need to protect the hygienic quality of milk and to ensure regularity of supplies throughout the year. Nevertheless, it is reasonable to assume that, if butter and cheese producers were not protected, the prices paid for fluid and processed milk would fall. The extent to which these prices would fall depends not only on the volume of milk production which could readily be diverted to fluid and processed milk and on the elasticity of demand for these products in response to price changes, but, above all, on the policies of Metropolitan Milk Boards. Accordingly, no useful calculation of the excess costs of fluid and processed milk due to the protection of butter and cheese can be made. However, on the assumption that Metropolitan Milk Boards would be willing to permit a greater flow of fluid milk to the cities, such excess costs would certainly be appreciable.

The Burden of Protection

35. The protection given to the dairying industry involves a transfer of income from the community as a whole (*i.e.* from taxpayers and from consumers of dairy products) to resources engaged in the dairying industry. The transfer itself does not involve loss of real income. We consider below to what extent such transfers may be justified. (See paras. 40-43.)

36. Nevertheless, the protection afforded to the industry does impose loss of real income on the community. In the first place, if there were no protection given to the dairying industry, some dairy producers would move into other industries where they could earn higher incomes. The real cost to the community here is the excess of the income they could earn in other occupations, over the export parity valuation of their production in the dairying industry, and it may well be substantial.

37. A second real cost to the community arises because of the distortions to consumer spending, and consequent loss of consumer satisfaction, arising from the artificially high prices of dairy products

and from restrictions on margarine. In our judgment, this second aspect of real cost may not be very important. If the demand for butter is fairly inelastic in response to price changes, consumers may not have reduced their butter consumption much below what it would have been had the price been lower. Moreover, despite restrictions, margarine seems to be plentifully available in the main centres of consumption. Margarine producers claim that the demand for margarine could be greatly increased if they were able to increase their output so that it became worth their while to undertake an extensive sales promotion campaign, and if they were free to improve the quality of margarine. Against this, we would point out that the artificially high home price for butter must have been a most powerful sales stimulant for margarine. If domestic prices for butter were not permitted to rise above import parity and an equivalent excise imposed on margarine (see para. 16), margarine producers might find it difficult to maintain, let alone to expand, their share of the market.

38. The main problems arising from protection for the dairying industry appear, then, to be two. First, can some or all the transfer of income from the community as a whole to the dairying industry be justified? Secondly, how serious is the real cost represented by foregoing the alternative production that would be undertaken if the dairying industry contracted in size?

The Effects of Protection

39. We consider below a number of grounds on which it is usually claimed that protection to the dairying industry can be justified. These are essentially arguments seeking to establish that worthy ends are secured by the protection, and that the community is therefore acting wisely in making transfer payments and incurring real costs in order to secure these ends.

I. A Fair Income for Dairymen

40. It is an accepted social principle, and one to which we ourselves adhere, that underprivileged members of the community should be assisted by the community if they are unable to assist themselves. To dairymen who cannot, even with financial and technical assistance, establish themselves profitably in the industry, and who cannot find alternative more profitable occupations, we should unhesitatingly recommend that assistance should be given.

41. This, however, does not establish a case for all the transfer payments now being made to dairymen. In particular, many of them would have satisfactory, sometimes quite high, incomes from dairying if protection were reduced as suggested earlier. Transfers to such farmers, in excess of the suggested level of protection, are an unnecessary burden, and would involve the subsidization of already rich farmers. (For some, this will remain true of even the reduced level of protection suggested, but this is an inevitable by-product of any system of overall subsidy or home price.)

42. Transfer payments are also unnecessary in cases where recipients could, with or without technical and financial assistance, raise their productivity in dairying to the point where they could earn satisfactory incomes at the reduced level of protection suggested; or where recipients could, again with or without technical and capital assistance, move into other occupations where they could earn satisfactory incomes either with no protection or with less protection than they have been enjoying in dairying. The community cannot be expected to subsidise its poorer members if their poverty is the result simply of a refusal on their part to increase their productivity or to move to other occupations.

43. With the level of protection reduced as suggested, and with special subsidies paid where they can help dairy farmers to get a better income or where they are demonstrably needed, the total burden of transfer payments can be reduced, and the remaining payments will be more evidently justifiable.

II. Returns Should be High Enough to Cover "Cost of Production"

44. The idea that returns should be high enough to cover costs of production is a special aspect of the idea of a fair income, discussed above. It is perfectly true that, for production to continue, costs of production must be covered by the prices received for the product. But the implication of this is not that the return to farmers should be raised, by subsidy, tariffs, import controls and restrictions on margarine, until it is high enough to cover the costs of whatever scale of production dairymen and governments like to sponsor. The true implication is that production should be carried on only up to the point where the costs of the marginal producer are no higher than the prices which people are willing to pay for the total amount being produced.

45. The scale and the costs of production in dairying have been pushed beyond this point only because protection has been given to the industry, making it worth while for farmers to incur extra costs of production. For instance, if more protection were now given to the industry, higher costs of production would be incurred, more marginal land would be brought into production, higher expenditure would be undertaken on land, stock, improvements and so on. The industry would then claim that the higher level of protection was needed in perpetuity, to cover the resulting higher costs. Similarly, State governments, in their zeal for land settlement, may open up new areas and put dairymen on farms which cannot pay their way even with current levels of protection. They will then seek to insist that the Commonwealth Government must provide protection through subsidy and home price at a level sufficient to cover costs, now inflated by the increased scale of production.

46. The scale and costs of production in any industry should be adjusted to what the market wants of the industry. Producers cannot

expect the community to pay for whatever costs of production they or our State governments think fit to incur.

III. The Use of Land and Labour by the Dairying Industry

47. It is often claimed that the dairying industry deserves protection by virtue of its using a lot of land and labour. This claim is, of course, valid only if resources are being used more effectively in dairying than they could be in other industries. If some of dairying's resources could be transferred elsewhere and earn more than they could in the dairying industry, then the community is suffering a real loss by giving them a degree of protection which encourages them to stay in dairying (see para. 36 above).

48. Any discussion of movement of resources should make full allowance for the fact that movement would be necessary only for a part of the industry's resources, and that the movement could and should be spread over a long time. Moreover, the greater the rate of expansion of the economy as a whole, the less movement will be required. Many people would be willing to move if given a favourable opportunity. Some people could be discouraged from entering the industry. Few people would need to be squeezed out of the industry by painful economic and administrative processes.

49. In making a judgment as to whether some resources could be used more effectively elsewhere, due allowance must, of course, be made for any protection they would enjoy in other industries. In other words, it is the value of production in alternative occupations, net of protection, to which attention should be paid. For instance, if some men engaged in the dairying industry could be found employment in other industries only by giving those industries a degree of protection comparable with that now enjoyed by the dairying industry, there would be no advantage from a contraction of the dairying industry.

50. It is often said that some men now engaged in marginal dairy production would be useless in any other occupation; that they are not transferable. If this were true, then it might be worth while giving them enough protection to enable them to carry on in dairying. This might still be so even if it would be cheaper to give them a life pension to do nothing, rather than to incur the further costs of enabling them to carry on dairying activities, for it is better for men to do something than to do nothing. We are not, however, inclined to give much weight to this argument that some of dairying's human resources are non-transferable. Given time, assistance to meet costs of movement and training, and ample employment opportunities elsewhere, we believe that few of the marginal people would find it impossible to make the adjustments necessary to achieve mobility.

IV. Dairying as an Earner of Export Income

51. Australia has long been concerned about the need to increase her export receipts in order to pay for her rising import needs. There

is a natural reluctance to support a policy which might reduce Australia's receipts from butter and cheese exports.

52. It is perfectly true that, between 1953-54 and 1957-58, exports of butter and cheese realized £131m., averaging £26m. a year. Over the same period, however, butter and cheese have enjoyed protection totalling £135m. It is impossible to believe that, at a much lower cost than this, we could not have increased other exports, or produced replacements for some of our imports, sufficiently to make up for any loss of export income, consequent on reduced protection for dairying.

53. The mere fact that the dairying industry earns some export receipts is not enough to justify it. It is necessary to show that no other use of its marginal resources could permit us either to earn more foreign exchange or to save expenditure on imports, and even this would not be an unequivocal justification of the industry if a shift of its marginal resources could raise real national income.

V. "Unfair" Competition from Margarine

54. There is naturally widespread resentment amongst dairymen against margarine producers. This is perfectly understandable; all existing producers of any commodity have always resented their more efficient competitors and successors. But if the cow is a less efficient producer of edible fats than the margarine industry, it must eventually be replaced.

55. It should, however, be emphasized that the dairying industry has only weakened its competitive strength *vis-a-vis* margarine by pushing its production to the point where it must be heavily protected. Our suggestion that butter should be placed on the home market at a price no higher than import parity and an appropriate excise be imposed on margarine (see para. 16) should greatly strengthen its position.

56. If under these circumstances margarine is able to maintain or expand its market in fair competition with butter, then it should be allowed to do so. The only reservation here is that it would be necessary to ensure that margarine producers, some of whom have great financial strength, do not undertake a long-term price-cutting campaign designed to cripple the dairying industry, leaving them eventually with a near-monopoly of the edible fats market.

57. The case against margarine is not strengthened by the argument sometimes advanced that margarine is cheap only because it uses the products of cheap overseas labour. International trade occurs precisely because countries concentrate on producing products at which they are relatively efficient, and exchange them in international trade with products from other countries which enjoy a relative advantage therein.

VI. Cheap Butter Exports as an International Gift

58. The chief beneficiaries of the protection given to Australian dairymen are the consumers in the United Kingdom to whom we ship the bulk of our exportable butter and cheese. We certainly believe that Australia, as one of the four or five richest countries in the world in terms of income per head, can well afford to make substantial gifts overseas and should do so. But in making those gifts, we should give them where they are most needed. Underdeveloped countries like Malaya, India, Indonesia and so on seem much more deserving recipients than the United Kingdom. Moreover, the gifts should be in terms of commodities of which we are comparatively efficient producers, like steel, rather than of butter and cheese, in which our relative efficiency is less.

Conclusion

59. To sum up, we believe that the overall protection given to the dairying industry should be reduced to what would amount to about 15% to 18% of its value at export parity when the U.K. price is at 300/- per cwt. (sterling).

60. This protection should be given by permitting the industry to determine the most profitable home prices for butter and cheese within the range set by export and import parities, and by imposing an excise on margarine equal to the margin between export and import parities for butter.

61. The present subsidy on butter and cheese produced should be abolished.

62. Tariffs and import controls on these products should be removed.

63. All restrictions on the quantity and quality of margarine production should be lifted.

64. The dairy price equalization system would be continued, in accordance with para. 17 above, and it might be desirable to establish a system for stabilizing incomes of butter and cheese producers within the limits thus set.

65. All these measures should be introduced gradually, during a transition period of five to ten years, to minimise any disruption of the industry resulting from the changes.

66. During the transition period, special schemes to provide technical and capital assistance should be devised, in order to strengthen the position of marginal producers who remain in dairying, in order to help those who wish to leave the industry, and in order to help those who can neither establish themselves in the industry profitably nor move out of it.

R. I. Downing
P. H. Karmel

University of Melbourne.
University of Adelaide.

APPENDIX

Local and Overseas Prices of Butter

(Australian currency)

Years in which:	Quantity of Butter Produced (m. cwts.)	Price (shillings per cwt.) Local	Overseas
Overseas price was below local price			
1934-35 to 1944-45	3·7	136·4	80·0
	2·5	161·9	140·7
Overseas price was above local price			
1945-46 to 1951-52	2·7	161·7	182·5
	2·6	291·8	429·1
Overseas price was below local price			
1952-53	3·3	404·5	389·2
1953-54	3·2	404·6	401·4
1954-55	3·8	403·3	386·3
1955-56	4·1	438·1	353·0
1956-57	3·8	453·4	298·6
1957-58	3·5	453·9	238·4
1958-59	3·8	(*a*)	(*a*)

(*a*) In 1958-59, the local price was presumably about 450/- per cwt. compared with, perhaps, 350/- overseas.

PAY-ROLL TAX, COSTS AND PRICES

Introduction

In 1941, a pay-roll tax was introduced in Australia to assist in financing the child endowment scheme which came into existence at that time. At present all employers, including the public authorities, with an average weekly wage bill of more than £200 are liable to the tax, which is charged at the rate of 2½% on total wage and salary payments in excess of this statutory exemption limit. Gross receipts from the tax in the financial year 1958-59 were £49·6 million, representing about 4·4% of the gross taxation revenue of the Commonwealth Government.

In recent years the tax has invoked considerable criticism, and a number of influential organizations have been seeking its removal.[1] Some of the criticism amounts to "special pleading", and a good deal more is made with a view to reducing the overall burden of taxation. On the other hand, it is widely held that a reform of the tax structure by which some form of direct taxation was substituted for the pay-roll tax, would prove beneficial to the economy. This idea is usually based on the proposition that the pay-roll tax has a direct effect in raising costs and prices, while a direct tax does not. This article is an attempt to examine, mainly from a theoretical standpoint, the likely effects of a tax reform in which the pay-roll tax was eliminated. The analysis is essentially short-run.

In the first part of the paper we examine the impact that the removal of the tax might have on price formation in individual markets and on the general level of domestic prices. In the second part we consider the most suitable method of tax reform which will ensure that the internal equilibrium of the economy is not disturbed when the pay-roll tax is eliminated. In the final section we appraise certain proposals for the partial elimination of the tax.

In order to simplify the analysis it is convenient to assume that the economy is in "balance" when the tax reform is introduced. However, this immediately raises a difficulty, for one of the supposed advantages of eliminating the pay-roll tax is that it would tend to increase the value of Australian exports and improve the long-run balance of payments position. If the economy is already in long-run external as well as internal balance, one of the basic reasons for a tax reform of this nature disappears. We therefore define the initial situation of "balance" in the following manner. The general level

1. Cf. *The Bank of New South Wales Review,* August 1957, p. 3: "The pay-roll tax has been extensively criticized as a tax on employment and as an insidious element in higher costs of production throughout industry and commerce, and of course where possible its burden is passed on in higher prices." See also *The Australian Financial Review,* May 21, 1959, p. 30: "Manufacturers, meanwhile, backed by the retail trade organizations, are again making the elimination of the pay-roll tax their No. 1 campaign this year."

of domestic prices is stable, while there is "full employment" in the sense that in the short run aggregate domestic output is inelastic. No endogenous forces are tending to change prices, wage-rates or the level of employment. The balance of payments is not in long-run equilibrium, since import restrictions are necessary to prevent a loss of foreign exchange reserves. However, there is short-run balance with an "autonomous" capital inflow offsetting the actual deficit on the balance of payments on current account. No external disturbances are tending to change this position.

I

Against this background we can examine the effect of the elimination of the pay-roll tax on domestic costs and prices. It is immediately apparent that the removal of the tax cannot *by itself* lead to a permanent reduction in the general level of prices which would be consistent with internal equilibrium. For suppose that all firms reduced their prices in proportion to the saving in labour costs which occurs when the pay-roll tax is taken off. In this new situation domestic prices are lower, but other factors have remained constant. Hence there will be an increase in the real value of wages and salaries and transfer incomes, an increase in the real value of liquid assets, an increase in the real value of *ex ante* investment expenditure and government expenditure, and given the money supply a probable reduction in the current rate of interest. There would therefore be an increase in the *ex ante* domestic demand for goods and services supplemented by an additional demand from overseas for the exports of this country. A considerable part of the additional *ex ante* demand would be directed towards domestic production rather than to imports, for as a result of the initial price reduction at home, imports have become relatively dearer than home-produced goods.

However, the supply of domestically produced goods is inelastic in the conditions of full employment which we assumed. It follows then that domestic prices will tend to rise towards the level existing before the removal of the tax, with the extent of the increase depending in the short run on the pricing policies of the firms, and the increase in the volume of imports. If prices were flexible the final equilibrium price might be somewhat higher than before, for the elimination of the tax has served to increase the budget deficit (reduce the budget surplus), which would normally have the effect of increasing the money demand for domestic goods and services and could at the same time bring about an increase in the money supply in private hands.[2]

Since a lower equilibrium price level will not be established automatically, the government has to decide at the outset what price

2. There will normally be a net increase in bank deposits if the budget deficit is increased, and a rise in the volume of Treasury Bills on issue to the banking system. H. C. Coombs, "The Development of Monetary Policy in Australia", E. S. & A. Bank Research Lecture at the University of Queensland, 1954.

level it wishes to see established after the elimination of the pay-roll tax. The tax reform will then be so arranged that at this particular level of prices *ex ante* aggregate demand will be equal to *ex ante* aggregate supply at full employment *if the government's anticipations prove correct.* In considering the appropriate price level the public authorities must necessarily make some assessment of the effect that the elimination of the pay-roll tax will have on the price policies of firms. For suppose it was felt that a permanent reduction in domestic prices would be advantageous and that firms would initially reduce their prices when the pay-roll tax was removed, then the tax reform would have to include suitable measures to reduce money disposable incomes while a reduction in the money supply would also be called for. But if government expectations proved incorrect and firms were not prepared to reduce their prices when the pay-roll tax came off, but instead increased wage-rates, then the tax reform in sharply reducing the money demand for domestic products would probably lead to a decline in output and employment rather than to lower prices. In the absence of other changes, the government could almost certainly correct this tendency to unemployment, but if wage-rates are inflexible in a downward direction, there would no longer be a possibility of attaining a lower level of domestic prices consistent with full employment equilibrium.

In what follows in this section we assume that the public authorities take the view that firms will pass on the saving in pay-roll tax to the consumers, and further that it would be beneficial for the economy if this lower level of prices could be maintained. For the moment we abstract from the question of which taxes are increased in support of the government's aim. We merely assume that by some means or other the government intends to reduce money disposable incomes by what it considers an appropriate percentage, and will vary the money supply in order to keep the rate of interest constant. We make the further assumption that the taxes which are increased do not directly lead to higher costs for the individual firm. This assumption may not be justified in practice, for example even an increase in the rate of tax on company profits might conceivably be treated as an increase in costs by firms which commonly price their products on the basis of "full cost".[3] Thus, when we consider below whether or not firms will reduce their prices when there is a change in the tax structure by which the pay-roll tax is eliminated, it should be borne in mind that we are analyzing the case which is the most favourable to a fall in domestic prices.

"Full-cost" pricing

We shall consider first the effect of eliminating the pay-roll tax in markets where the price is fixed on the basis of an assessment of "full-cost". To take a somewhat crude "full-cost" approach at the outset, let us suppose that the individual firm in determining the

3. Cf. P. J. D. Wiles, *Price, Cost and Output* (Blackwell, Oxford, 1956), p. 68.

selling price of each product adds a constant percentage margin to the prime costs per unit of output. The prime costs in this case consist only of direct labour costs and the cost of the material inputs. Then allowing for the existence of the pay-roll tax (but for simplicity ignoring the exemption limit), the unit price of the product will be

$$(1) \qquad P = (1 + g)[W(1 + t_w) + M]$$

where g = constant percentage margin
t_w = pay-roll tax rate
W = direct wage costs per unit
M = Materials cost per unit

If exemption from the pay-roll tax were granted to a single firm, the reduction in the selling price of a given product would depend on two factors—the tax rate previously charged, and the ratio of material costs to total prime costs per unit.[4] However, if the tax were removed altogether, other firms following a similar pricing procedure would reduce their prices, so that the original firm would then almost certainly experience a reduction in material costs as well as in its own direct labour costs.

The ultimate fall in the price of the final product cannot be readily determined even on the rather restrictive assumptions of the present case. However, the following considerations are relevant. The only materials which are not likely to fall in price as a result of the removal of the tax will be those imported from overseas. Hence the greater is the ratio of the overall import content to the overall wage content in the total factor cost of the final product, the smaller is likely to be the fall in its price.

As can be seen from the formula above, (g) the percentage margin is calculated on the prime costs *including the tax,* so that the tax is passed forward cumulatively from firm to firm as the materials proceed through to the finished product stage. This, of course, is a variant of the well-known phenomenon of tax "pyramiding".[5] The elimination of the tax "dismantles the pyramid" but it can be seen that the greater the degree of vertical integration in the productive process, other things being equal the smaller will be the fall in the price of the final product when the tax is removed.

We must now consider the validity of our initial assumption that the percentage margin remains constant. If in fact (g) tends to rise when the tax is removed, the fall in the selling price of the product will be less than in proportion to the reduction in prime costs. If the margin were raised sufficiently, there would be no price

4. The formula for the percentage fall in the selling price would be $\frac{t_w}{1+t_w}(1-m) \cdot 100$ where m is the ratio of material costs to total prime costs per unit before the elimination of the tax.

5. Bent Hansen (*Economic Theory of Fiscal Policy,* Allen & Unwin, pp. 274 and 276) seems to imply that a gross tax on wage payments like a tax on value added, does not cause problems of tax cumulation. This proposition does not appear to be universally true, for it depends on the methods of price determination in individual markets.

reduction and the fall in direct labour costs would merely result in a higher net profit.

The margin on any product will normally be fixed in the light of anticipated sales, so that an appropriate contribution is made towards the overhead costs of the firm, and a "reasonable" profit remains. As we are assuming full employment at the time of the tax reform, there is no reason why firms in the aggregate should expect an increase in the quantity sold after the tax change, although they might conceivably expect a reduction. Given confidence that the government would not by its own actions precipitate a fall in output and employment (except as a temporary accident), it seems most likely that firms as a whole would not expect the tax reform to influence greatly the volume of sales.

In that event, suppose the percentage margin which each firm sets is kept constant, then for most firms anticipated money receipts to cover overhead costs and profits will fall in approximately the same proportion as the selling price of the product. So that unless firms' overhead costs are reduced by the elimination of the pay-roll tax, a constant margin would seem to imply a fall in net profit not merely in money terms but also in "real terms". (Strictly speaking only in relation to the prices of each firm's own products.)

However, there is every likelihood that overhead costs will fall with the removal of the pay-roll tax. In many branches of industry overhead costs will comprise administrative costs, certain advertising and sales costs, and depreciation and amortization of buildings, equipment and machinery.[6] Since wages and salaries will represent a very substantial proportion of administrative and sales costs, the elimination of the tax might actually lead to a greater fall in overhead costs than in prime costs. Certainly depreciation and amortization charges would not fall if they were based on historical cost, but would do so if account is taken of the reduction in the replacement cost of buildings and equipment.

We therefore conclude that the percentage margin would probably not have to be raised to prevent a fall in "real" profits, and it is quite possible that constant margins would be consistent with an increase in "real" profits for certain firms. By itself, however, this conclusion does not provide sufficient evidence that firms pricing their products on the basis of "full-cost" will necessarily reduce their prices in proportion to the saving in direct costs when the pay-roll tax is eliminated.

It might be contended, for example, that firms attach some value to the maintenance of constant selling prices, and will not change these prices for comparatively small changes in their average costs. This argument is persuasive when a single firm in an industry group experiences a change in its average costs, while its competitors do not. But when the pay-roll tax is eliminated, the reduction in the

6. Strictly speaking, overhead costs should not include "user cost". Cf. J. M. Keynes, *General Theory of Employment, Interest and Money* (Macmillan), p. 53.

average costs will apply to all firms, and within any one industry group this reduction is likely to be of the same order of magnitude for each of them. In these circumstances any firm maintaining a constant selling price (thus increasing the profit margin on each of its products) is likely to lose business to its competitors unless there is active collusion between them to maintain prices.

Moreover, it must be noted that buyers of the products are also aware of the reduction in average costs, when such a reduction results from a tax change. Particularly if these buyers are other firms they will expect and can probably obtain a reduction in price which bears a close relation to the saving in average costs.[7]

In those instances where a Trade Association fixes list prices for industrial products on the basis of the average costs of the industry or of a "representative firm" in it, then the elimination of the pay-roll tax will also lead to a general reduction in the selling prices of the products of the member firms.

This brief survey suggests that if full-cost pricing is the general rule in the economy, the government could bring about a lower equilibrium cost and price level following the removal of the pay-roll tax. In order to do so, the tax reform must have the effect of reducing money disposable incomes to a sufficient extent, and the money supply in private hands will normally have to be reduced. This conclusion is, however, subject to the important proviso, noted above, that whatever fiscal change is necessary, apart from the pay-roll tax change, this should not be regarded by the firms themselves as an addition to their costs.

Demand determined prices

We shall now turn to consider the effect of the tax reform in markets where commodity prices are demand determined rather than cost determined. Only the limiting cases of perfect competition and monopoly will be considered.

The pay-roll tax is an element in the short-period average variable costs of the firm and will normally be reckoned as part of the short-period marginal costs.[8] Thus the elimination of the pay-roll tax will result in a downward shift in both the marginal and average cost curves of the firm. In the case of a firm operating in conditions of perfect competition, the planned increase in output which will follow this reduction in costs will depend on the expected market price in the period after the pay-roll tax has been eliminated. Suppose that all firms anticipated that the market price will remain unchanged after the tax reform, then each firm will attempt to increase output

7. Cf. P. W. S. Andrews, "Industrial Analysis in Economics", in T. Wilson and P. W. S. Andrews, *Oxford Studies in the Price Mechanism* (O.U.P.), p. 164.

8. To obtain very small increases in output at certain times, additional wages might not have to be paid, and hence the pay-roll tax would not enter into marginal costs. However, the pay-roll tax will always be a part of marginal cost if workers are paid on piece-rates.

to an extent which depends on the slope of the now lower marginal cost curve over the relevant range of output. In addition, new firms would enter the industry, being those who also held the view that the market price would not fall below the level established in the preceding period.

If all these planned increases in output were made effective, then the supply curve for the output of each industry would shift to the right, and given the position of the demand curve, prices would fall.

But obviously not all the planned increases in output can take place, for the aggregate supply is inelastic in the short period when there is already full employment of resources. Thus the main impact of the elimination of the pay-roll tax on these assumptions is to drive up wage-rates or earnings to the point at which, in equilibrium, wage costs per unit of labour are once again equal to the expected price times the marginal physical product of labour. In a simplified macro-economic model where the marginal physical product of labour is a function only of the level of aggregate employment in the short period, when the stock of capital is given, and if moreover employment cannot be increased at all, then the increase in wage-rates will absorb the whole of the reduction of costs brought about by the elimination of the pay-roll tax. Even if wage-rates do not rise quite to this extent, it seems unlikely that the government can bring about any significant reduction in domestic prices in these circumstances without at the same time causing a fall in the level of output and employment. For if as we have supposed the tax reform is arranged so that the money demand for goods and services is significantly reduced, this must eventually lead to a fall in expected as well as actual prices. But if as is usual, money wage-rates cannot be forced downward, the only possible method by which employers can attain a new equilibrium position such that wage-costs per unit of labour are equal to the now lower expected price *times* the marginal physical product of labour, is to reduce the level of employment and so raise the marginal physical product of labour.

The crucial factor which prevents the fall in prices taking place is, of course, the initial expectation that market prices in the next period will not be affected by the tax reform. If producers as a whole anticipate that market prices will fall when the pay-roll tax is eliminated, a good deal of the difficulty does not arise. For in this latter case there is little if any incentive for producers to plan a short-period increase in output, and wage-rates will not be driven up by competition for the available labour supplies. The tax reform will tend to reduce actual prices in line with expectations, and in the absence of any further disturbance there should be no marked changes in output or employment. It should be pointed out, however, that it would be remarkable if in practice the tax reform did not lead to some departure from equilibrium output and employment, albeit a temporary departure. For to avoid any disturbance whatever, would

require that the weighted average expectation of producers about the likely fall in price should coincide with the government's estimate of the price fall. Moreover, the government would have to be able to forecast correctly the precise effect on the level of monetary demand of the change in tax rates, and would have to time its monetary and fiscal changes perfectly.

Finally, we consider the reaction of the pure monopolist to the elimination of the pay-roll tax. Let us assume that the monopolist fixes prices in the light of the expected demand curve for his product, so that he will just sell the output indicated by the point of intersection of the expected marginal cost and the expected marginal revenue curve. When the pay-roll tax is removed the marginal cost curve is shifted downward and the point of intersection with the expected (and actual) marginal revenue curve of the previous period is therefore further to the right. If he expects the demand curve for his product to be unaffected by the tax reform, the monopolist will lower his price so as to clear the greater output, which, following the tax reform, appears to him to give the maximum profit. But the effect of the tax reform will be to shift the actual demand curve to the left (for the quantity demanded at any given price will be reduced by the reduction in money disposable incomes) and consequently the expected increase in sales will not take place. Presumably this outturn must eventually induce the monopolist to revise his expectations downward, so that for any given output he will decide to charge a lower price than before the tax reform. A lower equilibrium level of prices can thus be permanently established provided the government is able to bring about the appropriate reduction in aggregate money demand.

The reason why the result in this case appears to differ from the earlier example of perfect competition, when each firm also entertained the view that the demand curve for its products would remain unchanged, lies in the assumption that the monopolist is a price-fixer. If instead we had assumed that the monopolist commonly determines output rather than price we would have found a very similar result in both cases. That is to say, with unchanged expectations the tax reform would lead all monopolists to increase planned output. In an economy of monopolies this would lead to competition for the available labour supplies and, given full employment, wage rates would tend to be driven up. As we have shown above, it would then be extremely difficult for the government to bring about a permanent reduction in the price level without at the same time reducing output and employment below the full employment level.

The analysis above suggests that the assumption often made that the elimination of the pay-roll tax would necessarily result in lower costs and prices is somewhat misleading. Whether lower costs and prices will result or not, is seen even in these highly simplified examples to depend on the actual processes of price determination in different market situations, on the expectations of firms and of

the government, on the willingness of the government to support a lower price level, and on the precise nature of the tax reform.

II

We must now consider the precise nature of the fiscal and monetary changes which might be employed to attain internal and external equilibrium after the pay-roll tax had been eliminated. The choice of parameters will, however, be confined by the nature and the number of the aims of government policy.[9] So that in order to proceed it becomes necessary to postulate certain broad aims of economic policy. The following aims would probably have a high priority in most democratic communities today.

1. The maintenance of full employment with stable prices.[10]
2. The attainment of long-run as well as short-run equilibrium in the balance of payments.
3. The level of output in the investment goods industries (and the demand for investment goods) to be maintained.
4. As far as possible measures which would tend to increase the dispersion of real disposable incomes to be avoided.

On this basis we can arrive at the first necessary condition for the tax reform. It should be of such a nature that the real domestic demand for consumption goods is not increased. For in conditions of full employment at home, an increase in the domestic demand for consumption goods would lead to results incompatible with one or other of the aims of policy expressed above. For example, if the supply of consumption goods could not be augmented at all in the short run, an increase in demand would tend to lead to a rise in their prices above the desired equilibrium level. If the supply of such goods were increased by diverting resources from the investment goods industries, this would in the short run lead to a reduction in the output of investment goods. Alternatively, if the increased supply of consumption goods was to come about through an increase in imports, this would tend to cause disequilibrium in the balance of payments. For in conditions of full employment the volume of exports cannot be readily increased when the domestic demand for home-produced goods and services is excessive. Moreover, we have no reason to suppose that the prices of exports will be raised by the tax reform.

1. *Equilibrium in the Consumption Goods Market*

For simplicity we assume that the demand for consumption goods is a function of the real disposable incomes of wage and salary earners and of the real value of liquid assets $\left(\frac{L_w}{p_c}\right)$ held by wage-

9. In general, the number of parameters required is equal to the number of ends to be attained. B. Hansen, *op. cit.* p. 8.

10. The tax reform may bring about a reduction in the equilibrium level of prices. The term "stable prices" then refers to stability at this lower level of absolute prices.

earning households. There is an autonomous component in consumption demand represented by the government's purchases of consumption goods (G_c). The money disposable incomes of wage households consist of gross wage and salary payments (W), gross transfer incomes from the public authorities (R), less income tax payments levied at an average tax rate (t). The relevant price index for computing "real" values is the retail prices of consumption goods (p_c). Thus

$$(2) \qquad C_d = F\left[\frac{(W+R)\ (1-t)}{p_c}, \frac{L_w}{p_c}\right] + G_c$$

If, as we have supposed so far, the government wishes to establish a lower price level as a result of the tax reform, then given unchanged wage rates and government purchases of consumption goods, it will be necessary to increase direct tax rates on wage-earners' incomes, to reduce the money value of transfer payments to wage-earners' households, or in some way to reduce the volume of liquid assets (including government bonds) which are held by wage-earner households.

It is quite likely that in an economy in which transfer payments represent only a small proportion of the disposable incomes of wage-earner households and where the "Pigou" effect is unimportant,[11] it would be impossible to prevent a rise in the demand for consumption goods without increasing the rate of income tax on wages and salaries. However, it is worth considering briefly the possibility of reducing transfer incomes, because of the connection which exists in Australia between the payment of the pay-roll tax and the provision of child endowment.

Certain transfer payments, such as interest on the National Debt, are virtually fixed in money terms. Thus, if there is to be a reduction in the money value of transfer payments, the main cut will have to be in payments which depend on individual family circumstances, *e.g.* child endowment, unemployment relief, maternity allowances, age pensions. The idea of such reductions scarcely seems equitable or politically acceptable, but it also fails to meet the fourth of our aims that the tax reform should not increase the dispersion of real disposable incomes. For a lower price level following the elimination of the pay-roll tax would, other things being equal, increase the real disposable incomes of all wage-earner households in approximately the same proportion. If the payment of child endowment was then suspended to avoid an increase in the demand for consumption goods, the money disposable incomes of all households with a similar number of children would decline by the same absolute amount. In other words there would be a greater percentage reduction in the money disposable incomes of lower income households compared with higher

11. The Pigou effect could be unimportant if the value of holdings of liquid assets (L_w) was small in relation to current disposable incomes, or if an increase in the real value of liquid assets did not noticeably influence the demand for consumption goods.

income households. Unless it could be shown that on average there were more children in high income households, which is unlikely, it would follow that the dispersion of real disposable incomes must have increased as a result of a tax reform of this nature.

1(a). *Increasing rates of Personal Income Tax*

We may now consider the economic effects of a tax reform in which there is an increase in rates of personal income tax when the pay-roll tax is eliminated. If a lower price level is established following the change in the tax structure, we assume for the sake of simplicity that the retail prices of all consumer goods are reduced in the same proportion.

In principle it is not difficult to ensure that income tax rates are raised and exemption limits lowered in such a way that at the lower price level which the government anticipates, the real disposable incomes of all taxpayers are unchanged. There will, of course, be an increase in marginal rates of tax at all levels of money income, but given the anticipated reduction in the price of consumer goods, marginal disposable income in real terms will not have changed. Thus, as has been pointed out by Bent Hansen,[12] there is no obvious reason why a tax reform of this nature, which involves a switch from indirect to direct taxation, should have a disincentive effect on the supply of effort.

However, the situation becomes more complicated if we allow for the existence of a "Pigou" effect. For if the "Pigou" effect is positive and large it follows from equation (2) above that the demand for consumption goods will rise when there is a fall in their price, even if real disposable wage incomes are kept constant. In that case, if the government relies only on changes in income tax to preserve equilibrium in the consumer goods market, it will be necessary to raise the rates of tax until real disposable incomes have been reduced somewhat below the level existing before the tax reform. It is then no longer possible to derive any simple conclusion about the effect on incentives, although on *a priori* grounds one might expect that the supply of work would fall if real disposable wage incomes were all reduced in the same proportion. This can be seen in the following manner. An equal proportionate reduction in all real disposable incomes must necessitate an increase in real marginal rates of income tax at all income levels. Since this implies that for all workers the price of leisure at the margin has been reduced, by itself this change would tend to lead to a reduction in the supply of work. On the other hand, average real disposable incomes have fallen, a factor which, by itself, would be likely to have a favourable effect on incentives. Yet for some individuals at least the reduction in real incomes must be offset completely by the increase in real wealth which has been brought about by the lower price level, since in aggregate the

12. B. Hansen, *op. cit.*, pp. 267-269.

tax reform has left real consumption unchanged. For these individuals the change in the tax structure has a definite disincentive effect, and if it could be shown that this group could more easily vary their hours of work and productive effort than other wage and salary earners, this would point to an overall reduction in the supply of work. Some slender evidence suggests this conclusion, for it is likely that the ratio of the value of liquid assets to money disposable income rises with the individual's gross income. In that case the disincentive effect of the tax reform would be most pronounced for those earning large incomes, and it is sometimes suggested that these are the people who can most easily vary their supply of work and enterprise.

A tax reform which raised rates of personal income tax might also have some effect on savings. Any increase in marginal rates of income tax in money terms will reduce the net rate of interest which taxpayers can obtain on current savings. This may tend to diminish the propensity to save, or perhaps of more importance, it may increase the rate of dissaving on the part of the wealthy.[13] But in Australia at the present time there would not be a very great reduction in net rates of interest with a tax reform of this nature. For existing marginal rates of income tax are low compared with those operative in certain overseas countries (*e.g.*, the United Kingdom), and moreover there is a rebate of income tax of two shillings for every £1 of gross interest received from government bonds. If we assume that the gross yield on long-term government bonds is 5 per cent., then a person with a taxable income of £7,000 per annum can receive a net return of 2¾ per cent. at present rates of taxation. If the elimination of the pay-roll tax made it necessary to raise the marginal rate of tax at this income level by as much as 10 per cent., then the net rate of interest for such a person would only fall to just under 2½ per cent., provided the tax rebate was still allowed at the same rate.

But while the increase in income tax rates *per se* may not bring about a significant reduction in aggregate private savings in real terms, it is quite likely that when the expected fall in the price level is taken into account, there will be a reduction in the propensity to save. For the lower price level must mean an increase in the ratio of real wealth to real income after tax for any individual who holds liquid assets, for the tax reform has reduced his money disposable income without affecting the money value of liquid assets.[14] As Professor Meade has shown in a rather different context,[15] the very fact that the individual has a larger real wealth at his disposal against old age or a rainy day, and on the other hand has a real disposable income which is no greater than before, is likely to induce him to save less.

13. Cf. N. Kaldor, *An Expenditure Tax* (Allen & Unwin, 1955), pp. 92-95.
14. Assuming there is no change in the rate of interest.
15. J. E. Meade, "Is the National Debt a Burden?", *Oxford Economic Papers*, June, 1958.

It is generally conceded these days that a reduction in the propensity to save would be inimical to a high rate of economic growth, and inevitably it means that income tax rates would have to be higher than would otherwise be necessary in order to restrain expenditure on consumption goods adequately. The higher rates of income tax may in turn have disincentive effects on work and enterprise.

It is apparent then that if personal income tax rates were raised when the pay-roll tax was eliminated, any advantage stemming from the possible reduction in costs and prices would have to be weighed very carefully against the disincentive effects on work, enterprise, and savings which might result. However, the disincentive effects are mainly attributable to the fall in the domestic prices of consumer goods, and they will in general be more adverse the greater is the ratio of the domestic indebtedness of the government to the National Income.

1(b). *Sales Taxes replacing the Pay-roll Tax*

To this point we have been content to assume that it would be advantageous if the tax reform were to bring about a reduction in the general level of prices. This is an assumption made by many of those who advocate the removal of the pay-roll tax, but it is not at all clear whether there would be material advantages in lower prices for domestic consumption goods as distinct from lower costs of production, particularly for exportable commodities.

It is interesting, therefore, to consider the impact of a tax reform in which there is a uniform increase in sales tax on all consumer goods at the same time as the pay-roll tax is eliminated. Despite the fact that this involves the substitution of one form of indirect taxation for another, it will be apparent that the two taxes are not equivalent in their effects.

As before, the necessary condition for the tax reform is that it should not lead to an increase in the domestic demand for consumer goods, and indeed a reduction in demand might be necessary if, in conditions of full employment, an increase in net exports of consumer goods was required.

Given wage rates, income tax rates, the money value of transfer payments by the public authorities, and unchanged government expenditure on goods and services, the demand for consumption goods will not rise unless the tax reform brings about a reduction in the retail prices of those goods.[16] Hence, if the government can increase rates of sales tax by an amount necessary to offset the anticipated reduction in retail prices consequent on the removal of the pay-roll tax, the required equilibrium in the market for consumer goods will be maintained. In practice, there would be some changes in relative prices following a tax reform of this nature,[17] but there

16. See equation (2) above.

17. Partly because the "wage content" differs considerably between different commodities, and consequently the elimination of the pay-roll tax will not affect average/marginal costs of production equally in all cases.

is no reason why the prices of those goods which are consumed to a greater extent by low income households should rise relative to the prices of other goods. In other words, the tax reform may reasonably be regarded as neutral in its effect on the distribution of real disposable incomes.

This particular change in the tax structure, however, possesses all the advantages of the tax reform discussed above (where income tax rates were raised) so far as the relation between domestic prices and import/export prices are concerned. For the increase in sales tax will be applied to all consumer goods, whether imported or not. The elimination of the pay-roll tax on the other hand will only tend to reduce the prices of domestically produced goods. Hence the tax reform tends to make imported consumer goods relatively dearer and will normally lead to a substitution of home-produced goods for imports. Since the sales tax cannot affect goods which are exported, costs of production in the export industries will be lowered by the elimination of the pay-roll tax, and the prices of export goods may also be reduced.[18] These changes in relative prices might be expected to lead to an improvement in the long-run balance of payments position. But clearly the magnitude of the improvement depends crucially on the elasticities of demand and supply for exports and for imports from overseas. In conditions of full employment, the overall short-run elasticity of supply of exports is likely to be low as a result of the pressure of home demand. An increase in rates of personal income tax will serve to prevent an overall increase in the domestic demand for consumer goods, but it will not help to cut back the home demand for particular items of exports for which the overseas elasticity of demand is great. On the other hand, an increase in sales tax could be applied in a more selective manner so that there was a greater increase in rates of tax on "exportables" than on other consumer goods. The "substitution effect" of a differential increase in rates of sales tax would therefore tend to improve the balance of payments position to a greater extent by increasing the elasticity of supply of certain exports.

Thus a tax reform in which rates of sales tax were raised on a selective basis when the pay-roll tax was eliminated, can in principle ensure equilibrium in the market for consumer goods and can be expected to assist the balance of payments position more significantly than a tax reform which involves raising rates of personal income tax.[19] Moreover, such a change in the tax structure is not subject to certain of the disadvantages which were found to be present when income tax rates were increased.

For example, the sales tax discriminates directly against purchases of consumption goods, and has substitution effects as well as

18. In general the greater the price elasticity of demand for Australian exports, the smaller will be the fall in export prices.

19. As we shall see below it will probably be necessary to abandon certain quantitative import restrictions to avoid the inflationary effects of a short-run improvement in the balance of trade.

income effects. Consequently, the demand for consumption goods can be kept down to the previous level by raising less money revenue than would have to be raised if an income tax were used. The fact that the sales tax is in that sense more "efficient"[20] means that an individual whose real consumption expenditure is to be kept constant, will be on a higher indifference curve if this tax is imposed rather than an income tax. As has been suggested recently by A. Morag,[21] other things being equal, the community as a whole can also be regarded as "better off" if the more efficient tax is imposed, since more money balances and/or bonds are left in private hands.

It is also apparent that the increase in sales tax, unlike the increase in income tax, does not reduce the net rate of interest which can be obtained on current savings.

Finally, we have already seen that if the absolute price level is deliberately reduced when an increase in income tax replaces the pay-roll tax, the consequent increase in the real value of liquid assets may indirectly have disincentive effects on the supply of work, enterprise and savings. These disincentive effects will not be present when sales tax rates are increased, for given the money supply there will be no reduction in the absolute prices of consumer goods.

We conclude then that when the pay-roll tax is eliminated, the more suitable method of changing the tax structure in order to preserve equilibrium in the consumer goods market is to raise rates of sales tax rather than rates of income tax. It remains, however, to ensure that *ex ante* demand is equal to *ex ante* supply in the market for investment goods, and that the short-run equilibrium in the balance of payments is preserved.

2. *Equilibrium in the Investment Goods Market*

We can now regard the domestic output of investment goods as being virtually fixed in the short run, for we have assumed full employment, and have arranged the tax reform in such a way that output and employment in the consumption goods industries is kept constant. However, if sales tax rates were raised sufficiently high the balance of trade in consumption goods might well have become more favourable after the change in the tax structure, and it would then be possible to increase net imports of investment goods, including stocks of raw materials, without disturbing the short-run external balance.

What of the demand for investment goods? Let us assume, following Hansen,[22] that the inducement to invest depends on the output of consumption goods, the prices of capital goods in relation to the prices of finished consumer goods, and the rate of interest.

Now if the tax reform brings about the required objective, the

20. The notion of the "economic efficiency" of different taxes was brought out clearly by Kaldor (*op. cit.* p. 175).

21. A. Morag, "Is the Economic Efficiency of Taxation Important?", *Economic Journal*, March, 1959.

22. B. Hansen, *op. cit.*, p. 235.

output of consumption goods will remain unchanged. The market prices of capital goods will tend to fall in relation to the market prices of consumer goods, since the increase in the sales tax is applied to the latter alone, while the elimination of the pay-roll tax may be expected to affect the prices of both equally. However, this is unlikely to stimulate the inducement to invest, for of more significance is the relationship between the supply price of capital goods and the factor prices, as distinct from the market prices, of finished consumer goods. In fact, the prices of consumption goods less the sales tax are likely to have fallen in much the same proportion as the supply prices of capital goods, and hence one would not expect additional *ex ante* investment expenditure on this count.

Finally, we may consider the likely movement of the rate of interest. In the initial situation the supply of money in private hands, the supply of bonds, and the supply of equities, are all given. As a result of the tax reform in which sales tax rates are increased, the demand of wage-earner households for money balances for transaction purposes will be approximately constant. On the other hand, the elimination of the pay-roll tax tends to lead to a reduction in the demand for working cash balances on the part of firms, for wage-costs and the costs of domestically produced raw materials are somewhat lower than before. Hence the price of bonds will tend to rise until individuals and firms together are prepared to hold the available money supply. In short, the bond rate of interest will fall. If the money earnings expected on equities are not affected by the tax reform, then at the new level of bond prices, equities will be relatively cheaper than before in terms of bonds, and consequently their prices may tend to rise, too.

There is the possibility, however, that the money profits of some firms will tend to fall, if for example a constant profit margin is maintained on money prime costs reduced by the elimination of the pay-roll tax. If, out of these reduced money profits, a constant sum has to be paid as interest on old debentures, then the money earnings on equities may fall significantly. However, it must be regarded as unlikely that firms as a whole would allow net profits to fall in this way, when the real demand for goods and services has been maintained. It therefore seems reasonable to suppose that the yield on equities will fall somewhat, and that this will act as an inducement for firms to undertake additional investment. Moreover, we may note that if the supply price of investment goods has fallen, and the money value of liquid assets of firms (including government bonds) has remained constant or increased with the rise in bond prices, then firms are in a better position than before to finance additional investment.

Although the factors determining investment expenditure have been greatly simplified in this analysis, it is not improbable that the demand for investment goods will rise as a result of the tax reform, if the money supply is given. Hence, in order to preserve equilibrium

in the investment goods market, the government may have to permit a rise in net imports of investment goods, may have to restrict the money supply so as to avoid a reduction in the bond rate of interest and in equity yields, and/or may have to raise the supply price of investment goods by increasing rates of sales tax on such goods.

3. *The Balance of Payments*

The final piece in the jigsaw, the balance of payments, can now be fitted into place. When the tax reform was introduced there was already short-run external balance of a kind, made possible by the use of quantitative import restrictions. The elimination of the pay-roll tax together with the increase in rates of sales tax on consumer goods, is likely to lead to a more favourable balance of trade, but given the domestic demand for goods and services, this will disturb the short-run internal equilibrium and set up inflationary pressure at home. This can be avoided if some or all of the import restrictions are lifted, so that there remains short-run external balance and a closer approach to a true long-run equilibrium in the balance of payments. But this solution is only possible if we are able to assume that the changes that have been made in the various fiscal and monetary policy parameters do not adversely affect the capital inflow from overseas. This, however, is a reasonable assumption in the Australian case, for much of the capital immigration is for a long term, and a possible fall in the rate of interest is likely to be of relatively minor significance when in other respects the tax reform has maintained full employment and somewhat improved the prospects for the balance of trade.[23]

We may now summarize the main threads of the argument. In this part we have had two objectives in mind. First, to show that the advantages of eliminating the pay-roll tax cannot be examined in isolation, but must be viewed in relation to those other changes in government parameters which are necessary to preserve the internal and external equilibrium of the economy. Secondly, and more specifically, we have tried to show that a tax reform in which rates of sales tax on consumer goods are increased when the pay-roll tax is removed can be expected to result in an improvement in the long-run balance of payments position without introducing some of the possible adverse effects on savings and the supply of work which might result from an increase in rates of income tax.

The above analysis cannot be regarded as an exhaustive study of the incidence of the pay-roll tax. We have confined our attention to the problems of preserving short-run equilibrium, and in so doing have omitted reference to the fact that the removal of the pay-roll tax by reducing wage-costs, might in the long run lead to the use of more labour-intensive methods of production.

While this question would have to be considered in detail in

23. This is not to say that other possible tax changes which we have not considered, *e.g.* an increase in rates of company tax, might not adversely affect borrowing from overseas.

a complete study of the tax, it may be pointed out that even in a static model a change in the relative prices of various factors need not lead to an increased use of the factor which has become relatively cheaper.[24]

III

In conclusion we consider the more practical question of whether the Australian pay-roll tax should be eliminated altogether, or whether the same net benefits could be achieved more simply by exempting certain firms from payment of the tax. An interesting proposal for the partial elimination of the pay-roll tax has been put forward by Professor Cochrane.[25] The proposal is that a rebate of tax should be made to each firm according to the proportion of its output which it exports. The object of the taxation remission is to increase the volume of exports by "encouraging producers to seek wider markets for their products abroad".

This particular change is envisaged as a reduction in taxation rather than as a reform of the tax structure, and it has the merit of greater simplicity than the various proposals for reform that we have considered above. There are two other factors which suggest that Professor Cochrane's proposal would be preferable to the complete elimination of the pay-roll tax. The first, that it may be wise to make only limited tax remissions in view of the possibility that, in conditions of full employment, the complete removal of the tax might lead to greater competition for the limited labour supplies, and hence drive up wage-rates.[26] The second advantage of a partial approach which is not altogether insignificant, is that pay-roll tax returns would still have to be completed by firms. Since these returns are an invaluable source of statistical information on employment and earnings in Australia, they should not be abandoned without due consideration.

Nevertheless there are a number of factors which suggest that a more thorough-going reform of the tax structure would be necessary to achieve a significant improvement in the long-run balance of payments position.

1. It seems clear that even if all firms engaged in the export trade were exempted from the payment of pay-roll tax, the consequent reduction in their costs of production would be much less than if the tax were eliminated altogether. For whereas the total removal of the pay-roll tax would normally result in a reduction in the prices charged to exporters for raw materials which had been produced or partly processed in Australia, this would not be the case if the tax remission were granted to exporters alone.[27]

24. J. R. Hicks, *Value and Capital*, pp. 93 ff.

25. Australia Unlimited—Supplement to the *Sydney Morning Herald*, July 13, 1959, p. 7. *Australian Financial Review*, May 28th, 1959, p. 10.

26. See Part I of this paper.

27. This can be appreciated from a glance at equation (1) above, where we noticed that raw materials costs per unit would not fall if exemption from pay-roll tax were only granted to a single firm. This conclusion is valid whether firms price their products on the basis of "full cost" or anticipated demand.

In fact, in the latter instance the reduction in the unit cost of exported goods would be of the second order of small quantities if the exporter was a firm which added only a small fraction of the total value of the final exported product. The reduction in unit cost would be large only if a vertically integrated concern was responsible for the exporting as well as most of the other stages in the productive process.

2. The limited tax rebate would not help to relieve the pressure of home demand for exportable commodities. It is therefore rather doubtful whether the elasticity of supply of exports would be sufficiently great in the short run to bring about a substantial improvement in the balance of payments position. Professor Kahn put this well in a discussion on Britain's home and export trade a few years ago. "The business-man does not necessarily react in the same way when it is a question of choosing between a very profitable overseas market and a moderately profitable home market as when it is a question of choosing between a moderately profitable overseas market and an unprofitable (or absolutely limited) home market. In some ways the stick is more effective than the carrot."[28] This suggests that there is much to be said for increasing rates of sales tax particularly on exportable items at the same time as the pay-roll tax is eliminated.
3. A tax rebate is more likely to be regarded as temporary than is a complete reform of the tax structure. It is unlikely that firms would undertake the heavy initial costs of developing new export markets unless there was absolute certainty that they would continue to receive the pay-roll tax rebate in later years.
4. A tax rebate to exporters tends to redistribute income in favour of this group. This redistribution can be avoided by a tax reform in which sales tax rates are raised, and domestic demand reduced commensurately with the increased demand from overseas.
5. The complete elimination of the pay-roll tax would raise the prices of imports relative to goods produced at home. This result of the reform may contribute as much to the attainment of true equilibrium in the balance of payments, as the reduction in the costs of production of exports. The limited tax rebate on the other hand does not change the relation between domestic prices and imported prices.

On balance there seems to be a stronger case for the complete removal of the pay-roll tax and a compensating increase in sales tax, than for the partial approach suggested by Professor Cochrane.

B. L. JOHNS

Newcastle University College,
University of New South Wales.

28. R. F. Kahn, "Home and Export Trade—II", *Economic Journal*, 1951.

LINEAR PROGRAMMING, IMPORT CONTROLS AND THE EXCHANGE RATE WHERE THE SUPPLY OF EXPORTS IS INELASTIC

I. Assumptions

This paper is concerned with the allocation of foreign exchange in an economy whose technological possibilities can be represented by a set of constant input-output coefficients, whose volume of exports is limited by the supply of a specific factor, and which is dependent on imports for supplies of certain producers' goods.[1] More particularly the following assumptions are made.

(1) There are three factors of production: land, labour and imported producers' goods.[2]

(2) There are s exported goods.[3]

(3) The total supply of land is used in the production of the exported goods, and land is not required for the production of any other good.

(4) In addition to the exported goods there are n other consumers' goods each of which can be either imported or produced at home. These will be referred to as "non-exported" consumers' goods.

(5) The consumption of each "non-exported" consumers' good is a function of wage income, rent and the prices of the $n + s$ consumers' goods.[4]

(6) The functions referred to in (5) have the following properties:

  (a) They are continuous and non-negative.

  (b) They are restricted in such a way that expenditure equals income.

(7) There is only one available technique for the home production of each good.

(8) The ratios, l_i and m_i, of the inputs of labour and of imported producers' goods into the ith home industry to the output

1. These assumptions appear to be approximately satisfied for certain countries (New Zealand, for example) whose exports are almost entirely agricultural and where almost all farm land is in use.

2. Imported producers' goods are assumed to include materials and equipment which can be produced only with the aid of certain factors which the economy does not possess. Capital is not treated as a factor since the analysis is confined to positions of stationary equilibrium in which the rate of profit has been reduced to zero.

3. It is assumed that there is a wide range of exchange rates at which it will be profitable to export these and no other goods. But there may, within this range, be exchange rates at which it will be more profitable to produce certain other goods for home consumption than to import them. For the import price of a good will exceed the export price of the same good by twice the cost of transport from one country to another plus the amount of any foreign tariff.

4. Provided that the amount of each factor supplied by each individual is constant, the distribution of income between individuals will be determined by its factorial distribution.

of that industry are, when the economy is in stationary equilibrium, constants.

(9) There is perfect competition within the economy.

(10) There are two instruments of policy:
  (*a*) the exchange rate (price of foreign currency in terms of home currency); and
  (*b*) import controls.

(11) The following are exogenous in the sense that they are independent of each of the other variables discussed:
  (*a*) the supplies of land and labour;
  (*b*) the import prices (including transport costs and measured in units of foreign currency) of producers' and consumers' goods;
  (*c*) the production, home consumption and price (in units of foreign currency) of each exported good;
  (*d*) the money wage rate.

In a stationary economy, where saving and capital accumulation are zero, the values of imports and exports are necessarily equal at any exchange rate.[5] But not all exchange rates are consistent with full employment and free importing. If, for example, the exchange rate is sufficiently low, the import price of every "non-exported" consumers' good will be less than its home cost of production, and there will be unemployment equal to the excess of the total supply of labour over the demand for labour by the export industries. Moreover, unless the coefficients, m_i, are sufficiently small, it may be technologically impossible to achieve full employment with the given supply of foreign exchange.

It will be shown, however, that:

(1) if the coefficients, m_i, are sufficiently small, there will be some exchange rate at which the economy would remain in a position of stationary equilibrium with free importing and no excess supply or demand for labour; and

(2) the resulting allocation of resources would be efficient in the sense that there is no pattern of import controls which would bring about a greater consumption of some goods and the same consumption of other goods.

II. Free Importing Solution

The following symbols will be used:

Constants and Exogenous Variables

Q_{poi} = production of ith exported good.
Q_{coi} = home consumption of ith exported good.
$Q_{xoi} = Q_{poi} - Q_{coi}$ = exports of ith exported good.
L_s = supply of labour.

5. The same is, of course, true of a growing economy in which equality between saving and capital formation is maintained by monetary or fiscal policy.

L_o = quantity of labour employed in export industries.
M_o = value (in units of foreign currency) of imported producers' goods used in export industries.
l_i = ratio of input of labour into ith non-export industry to output of that industry.
m_i = ratio of input of imported producers' goods (in units of foreign currency) into ith non-export industry to the output of that industry.
p_{xoi} = price (in units of foreign currency) of ith exported good.
p_{mi} = import price (in units of foreign currency) of ith "non-exported" consumers' good.
w = money wage rate.
$a_i = \dfrac{wl_i}{p_{mi} - m_i}$

It is convenient to number the goods so that $a_1 < a_2 \ . \ . \ . < a_n$. The strict inequality signs involve no loss of generality, since goods for which the coefficients a_i are equal can, in the following argument, be treated as a single good.

Endogenous Variables

Q_{pi} = home production of ith "non-exported" consumers' good.
Q_{mi} = imports of ith "non-exported" consumers' good.
Q_{ci} = consumption of ith "non-exported" consumers' good.
L_d = demand for labour.
F_d = demand for foreign exchange.
p_{ci} = internal price (in units of home currency) of ith "non-exported" consumers' good.
R = rent.

Policy Variable

r = exchange rate.

If there are no import controls, then the following equations must be satisfied in order for the system to be in stationary equilibrium at any given exchange rate.

Demand Relations

(1) $Q_{ci} = D_i(rp_{xo1}, \ . \ . , rp_{xos}, p_{c1}, \ . \ . , p_{cn}, wL_d, R) \quad (i = 1, \ . \ . , n)$

Technological Relations

(2) $L_d = \sum_{i=1}^{n} l_i Q_{pi} + L_o$

(3) $F_d = \sum_{i=1}^{n} p_{mi} Q_{mi} + \sum_{i=1}^{n} m_i Q_{pi} + M_o$

Equilibrium Conditions

(4) $\left.\begin{aligned} Q_{pi} &= 0 \quad & r < a_i \\ Q_{mi} &= 0 \quad & r > a_i \end{aligned}\right\} \ (i = 1, \ . \ . , n)$

$$(5)\quad \begin{matrix} p_{ci} = rp_{mi} & r \leqq a_i \\ p_{ci} = wl_i + rm_i & r \geqq a_i \end{matrix} \Big\} \quad (i = 1, \ldots, n)$$

$$(6)\quad Q_{mi} + Q_{pi} = Q_{ci} \qquad (i = 1, \ldots, n)$$

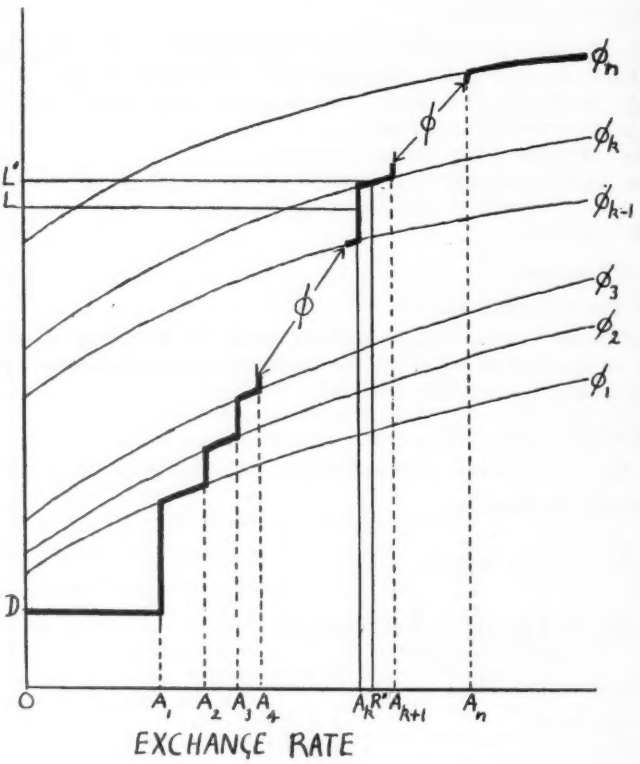
Definition

$$(7)\quad R = r \sum_{i=1}^{s} p_{xoi}\, Q_{poi} - wL_o - rM_o.$$

Since the demand equations have the property that expenditure equals income, equation (8) can be derived from equations (1) to (7).

$$(8)\quad F_d = \sum_{i=1}^{s} p_{xoi}\, Q_{xoi}.$$

Let us now consider the conditions under which there will be an exchange rate at which the economy would remain in stationary equilibrium, without import controls, and with no excess supply or demand for labour. Such a rate will be referred to as a "full employment equilibrium exchange rate".



In the figure let $OD = L_o$, $OA_1 = a_1$, and ϕ_h be the graph of the function defined by (9).

$$(9)\quad \phi_h(r) = L_o + \sum_{i=1}^{h} l_i D_i(rp_{xo1}, \ldots, rp_{xos}, wl_1 + rm_1, \ldots, wl_h + rm_h, rp_{mh+1}, \ldots, rp_{mn}, wL_s, r\sum_{i=1}^{s} p_{xoi} Q_{poi} - wL_o - rM_o) \quad (h = 1, \ldots, n)$$

Although the functions $\phi_h(r)$ have been represented in the figure as increasing functions of r, nothing can be deduced about the forms of these functions except that they are continuous, non-negative and non-intersecting. A necessary and sufficient condition for the existence of a full employment equilibrium exchange rate, r^*, is that there is a point on the heavy curve, ϕ, whose ordinate is equal to L_s.[6] Then r^* is equal to the abscissa of this point. But r^* may involve both imports and home production of some good (for example where $L_s = OL$ so that $r^* = OA_k$) or no such mixture (for example where $L_s = OL'$ so that $r^* = OR'$).

In the former case (where $r^* = OA_k$) the equilibrium values of the $4n + 3$ variables $Q_{p1}, \ldots, Q_{pn}, Q_{m1}, \ldots, Q_{mn}, Q_{c1}, \ldots, Q_{cn}, p_{c1}, \ldots, p_{cn}, L_d, F_d$, and R are determined by the $4n + 3$ independent equations (1), (2), (3), (4a), (5a), (6), (7a) and (10).

$$(4a)\quad Q_{pi} = 0 \qquad (i = k+1, \ldots, n)$$
$$Q_{mi} = 0 \qquad (i = 1, \ldots, k-1)$$
$$(5a)\quad p_{ci} = r^* p_{mi} \qquad (i = k+1, \ldots, n)$$
$$p_{ci} = wl_i + r^* m_i \qquad (i = 1, \ldots, k)$$
$$(7a)\quad R = r^* \sum_{i=1}^{s} p_{xoi} Q_{poi} - wL_o - r^* M_o$$
$$(10)\quad L_d = L_s.$$

Equation (10) is, in this case, an independent restriction. For $r = r^*$ is, as can be seen from the figure, a necessary but not a sufficient condition for $L_d = L_s$. If, when $r = r^* = a_k$, the system is in stationary equilibrium with full employment it will remain in this position; but it could also remain in a position of stationary equilibrium with some unemployment.[7]

In the latter case (where $r^* = OR'$) the equilibrium values of the variables are determined by the $4n + 3$ independent equations (1), (2), (3), (4b),

$$(4b)\quad Q_{pi} = 0 \qquad (i = k+1, \ldots, n)$$
$$Q_{mi} = 0 \qquad (i = 1, \ldots, k)$$

5(a), (6) and (7a) and these values will also satisfy (10).

6. The curve ϕ does not show the demand for labour at exchange rates other than the full employment equilibrium rate. For only when there is full employment will wage income be equal to the term wL_s which appears in the functions $\phi_h(r)$. Thus ϕ shows the direct effect, on the level of employment, of a given reduction in the exchange rate from the full employment equilibrium rate, but ignores the indirect effect caused by the reduction in wage income.

7. Full employment could be maintained by allowing the exchange rate to vary between points slightly above and below a_k.

Since the functions $\phi_h(r)$ are not necessarily monotonic, there may be several full employment equilibrium exchange rates. A sufficient condition for the existence of at least one such rate is that $\phi_n(r) \geqq L_s$, for some r such that $r \geqq a_n$. This condition must be satisfied if the coefficients m_i are sufficiently small. For since the forms of the demand functions are restricted in such a way that expenditure equals income, we have

$$(11)\quad \sum_{i=1}^{s} rp_{xoi}\, Q_{coi} + \sum_{i=1}^{n} (wl_i + rm_i)\, D_i\,(rp_{xo1}, \ldots, rp_{xos}, w_1l_1 + rm_1, \ldots, w_nl_n + rm_n, wL_s, r\sum_{i=1}^{s} p_{xoi}\, Q_{poi} - wL_o - rm_o) = wL_s + r\sum_{i=1}^{s} p_{mi}\, Q_{poi} - wL_o - rM_o.$$

Therefore

$$(12)\quad \phi_n(r) = L_s + \frac{r}{w}\left[\sum_{i=1}^{s} p_{xoi}\, Q_{xoi} - M_o - \sum_{i=1}^{n} m_iD_i\,(rp_{xo1}, \ldots, rp_{xos}, w_1l_1 + rm_1, \ldots, w_nl_n + rm_n, wL_s, r\sum_{i=1}^{s} p_{xoi}\, Q_{poi} - wL_o - rM_o)\right]$$

The term in square brackets, on the right hand side of (12), must be positive for some r ($r \geqq a_n$) provided that the coefficients, m_i, are sufficiently small; and there must, in this case, be a full employment equilibrium exchange rate. But a set of coefficients, m_i, which is sufficiently small to ensure that full employment is technologically possible, will not necessarily be sufficiently small to ensure that there is a full employment equilibrium exchange rate.

III. Efficiency of Free Importing Solution

Suppose now that there is a full employment equilibrium exchange rate r^*, and let Q^*_{pi}, Q^*_{mi} and Q^*_{ci} be the corresponding equilibrium values of Q_{pi}, Q_{mi} and Q_{ci} respectively. Full employment could also be attained by fixing the exchange rate at a level below r^* and controlling imports directly. We shall show, however, that it would be impossible, in this way, to obtain a different set of consumption levels $Q'_{c1}, \ldots, Q'_{cn}$ such that $Q'_{c1} \geqq Q^*_{c1}, \ldots, Q'_{cn} \geqq Q^*_{cn}$.[8] Suppose that this were possible. Then it would be technologically possible to obtain consumption levels $Q^*_{c1}, \ldots, Q^*_{cn}$ and have either unemployment, a surplus of foreign exchange, or both. It will be sufficient, therefore, to show that the latter is impossible.

Consider the following linear programming problem. Find non-negative values of $Q_{m1}, \ldots, Q_{mn}, Q_{p1}, \ldots, Q_{pn}, Q_{c1}, \ldots, Q_{cn}, u, v$ which maximize $B = bu + v$ subject to the constraints (13) to (16), where b is any positive number which is less than $\frac{w}{a_n}$. We shall prove the

8. This could be shown by making use of propositions established by Koopmans, *Activity Analysis of Production and Allocation* (New York, 1951). Here we shall give a simple direct proof.

proposition stated in the previous paragraph by showing that the solution to this problem is $Q^*_{m1}, \ldots, Q^*_{mn}, Q^*_{p1}, \ldots, Q^*_{pn}, Q^*_{c1}, \ldots, Q^*_{cn}, 0, 0$.

$$(13)\quad L_s - L_o - \sum_{i=1}^{n} l_i Q_{pi} - u = 0$$

$$(14)\quad \sum_{i=1}^{s} p_{xoi} Q_{xoi} - M_o - \sum_{i=1}^{n} p_{mi} Q_{mi} - \sum_{i=1}^{n} m_i Q_{pi} - v = 0$$

$$(15)\quad Q_{mi} + Q_{pi} - Q_{ci} = 0 \qquad (i = 1, \ldots, n)$$

$$(16)\quad Q_{ci} - Q^*_{ci} = 0 \qquad (i = 1, \ldots, n)$$

Let us take first the case in which $r^* = a_k$ so that $Q^*_{m1} = \ldots = Q^*_{mk-1} = Q^*_{pk+1} = \ldots = Q^*_{pn} = 0$. We can then choose $Q_{mk}, \ldots, Q_{mn}, Q_{p1}, \ldots, Q_{pk}, Q_{ci}, \ldots, Q_{cn}$ and v as basic variables and the basic feasible solution is $0, \ldots, 0, Q^*_{mk}, \ldots, Q^*_{mn}, Q^*_{p1}, \ldots, Q^*_{pk}, 0, \ldots, 0, Q^*_{c1}, \ldots, Q^*_{cn}, 0, 0$.[9] Eliminating $Q_{mk}, \ldots, Q_{mn}, Q_{p1}, \ldots, Q_{pk}, Q_{c1}, \ldots, Q_{cn}$ from equations (13) to (16) we obtain

$$(17)\quad v = \sum_{i=1}^{k-1}\left[m_i - p_{mi} + \frac{l_i(p_{mk} - m_k)}{l_k}\right]Q_{mi} + \sum_{i=k+1}^{n}\left[p_{mi} - m_i + \frac{l_i(m_k - p_{mk})}{l_k}\right]Q_{pi} + \left(\frac{m_k - p_{mk}}{l_k}\right)u + \sum_{i=1}^{k-1}\left[\frac{l_i(m_k - p_{mk})}{l_k} - m_i\right]\left[Q^*_{ci} - \sum_{i=k}^{n} p_{mi} Q^*_{ci} + \sum_{i=1}^{s} p_{xoi} Q_{xoi} - M_o + \left(\frac{p_{mk} - m_k}{l_k}\right)(L_s - L_o)\right] = \sum_{i=1}^{k-1} wl_i\left(\frac{a_i - a_k}{a_i a_k}\right)Q_{mi} + \sum_{i=k+1}^{n} wl_i\left(\frac{a_k - a_i}{a_i a_k}\right)Q_{pi} - \frac{wu}{a_k} + A$$

where A is a constant. Finally we obtain:

$$(18)\quad B = \sum_{i=1}^{k-1} wl_i\left(\frac{a_i - a_k}{a_i a_k}\right)Q_{mi} + \sum_{i=k+1}^{n} wl_i\left(\frac{a_k - a_i}{a_i a_k}\right)Q_{pi} + \left(b - \frac{w}{a_k}\right)u + A.$$

It follows, since the coefficients of the non-basic variables in the above expression for B are all negative, that the basic feasible solution maximizes B. This completes the proof for the first case.

Consider now the case in which $a_k < r^* < a_{k+1}$ so that $Q^*_{m1} = \ldots = Q^*_{mk} = Q^*_{pk+1} = \ldots = Q^*_{pn} = 0$. Again we can choose $Q_{mk}, \ldots, Q_{mn}, Q_{p1}, \ldots, Q_{pk}, Q_{c1}, \ldots, Q_{cn}$ and v as basic variables. But, in this case, the basic feasible solution includes an additional zero value. The basic feasible solution is $0, \ldots 0, Q^*_{mk+1}, \ldots, Q^*_{mn}, Q^*_{p1}, \ldots, Q^*_{pk}, 0, \ldots, 0, Q^*_{c1}, \ldots, Q^*_{cn}, 0, 0$. Equation (18) still applies, however, so that the proof is identical with that for the first case.

9. For definitions of "basic variables" and "basic feasible solution" see S. Vajda, *The Theory of Games and Linear Programming* (London, 1958).

IV. Conclusions

It has been shown that, under the given assumptions, and provided that a full employment equilibrium exchange rate exists, free importing will be optimal in the sense that it would be impossible, by controlling imports, to increase the consumption of one good without decreasing the consumption of another. Because of the assumption that the volume of exports is exogenous an optimum allocation of resources, in this sense, could also be obtained by fixing the exchange rate at a level below the full employment equilibrium level, and placing a uniform *ad valorem* tariff on imports. But, in this case, the distribution of income would be different, real wages being greater and real rent smaller than under free importing. The quantities of different goods imported, produced at home and consumed, would also be different.

If the volume of exports is not exogenous, the elasticity of supply of exports being positive, then the free importing solution will not generally be optimal. For, unless the demand for each export good is infinitely elastic, tariffs or import controls will improve the terms of trade.

R. BERGSTROM

University of Auckland.

THE OVERSEAS TRADE IN NEW SOUTH WALES COAL AND THE BRITISH SHIPPING INDUSTRY, 1860 - 1914

I

In 1929 a Royal Commission, headed by Mr. Justice Davidson, was set up to inquire into the "present position" of the New South Wales coal industry and into the causes which had led to its sharp decline after World War I. The Davidson Commission investigated, *inter alia*, the overseas trade in N.S.W. coal. It adduced three reasons for the virtual disappearance of coal exports in the twenties: the high price of N.S.W. coal and the uncertainty of its supply; the substitution of oil as a bunkering fuel; and competition overseas from indigenous coal mining, often protected, or from rival producers exploiting identical markets.[1] There can be no substantial disagreement with these conclusions. But they leave out of account the fundamental changes wrought in the Australian economy during and after World War I. These changes in turn transformed the pattern of ship utilization which before 1914 had made possible the development of an export trade in N.S.W. coal. The purpose of this article is to outline the association between N.S.W. coal and the British shipping industry which enabled about one-third of the coal raised in N.S.W. between 1860 and 1914 to be exported.[2]

Despite the early origins of coal mining in N.S.W. the industry as late as 1860 was not very important either locally or in the Australian economy as a whole. Its labour force and output were small, its organized market largely confined to Sydney. Intercolonial and overseas shipments were infrequent, even haphazard, in the absence of any systematic attempt to organize wider markets. The true years of expansion in N.S.W. coal mining lay between 1860 and 1900.[3] Labour employed in the industry rose from less than one thousand to almost twelve thousand; as a proportion of the occupied male work force from 0·75% to 2·58%. An expensive search for new coal fields and seams, heavy injections of capital, much of it drawn from local sources, and vigorous attempts to improve technology by the adaptation of foreign methods, forced up output to almost six million tons. Increased production was designed primarily to cater for steeply

1. New South Wales (= N.S.W.) Leg. Assembly, *Report of the Royal Commission . . . into . . . the Coal Industry* (1930), p. 301.

2. The developments referred to in this article relate almost entirely to the northern coal field of N.S.W. of which Newcastle is the centre. The other two coal fields, the southern and western, were, and still are, comparatively small producing areas. Overseas exports of coal were drawn chiefly from the northern district.

3. The economic history of the N.S.W. coal mining industry is yet to be written. For some information see F. R. E. Mauldon, *A Study in Social Economics —The Hunter River Valley, New South Wales* (Melbourne, 1927) and *The Economics of Australian Coal* (Melbourne, 1929); A. G. L. Shaw and G. R. Bruns, *The Australian Coal Industry* (Melbourne U.P., 1947).

rising demand from local and intercolonial consumers as the Australian economy grew. The supply of coal tended to outrun demand from Australian sources, however, and additional outlets became necessary to absorb excess capacity. They were found in overseas markets to which were consigned, on average, about 30% of total output between 1860 and 1914. Exports of coal were made possible by its relatively low price in foreign markets. Its price advantage was largely the product of cheap coal freights. These in turn were the product of extraneous factors associated with changes in the volume and direction of world bulk trade. In the pattern of trade so established, coal exports from N.S.W. were assigned an essential role.

Rising demands on the world's carrying industry in the nineteenth century derived in part from the declining ability of west Europe to feed itself, which necessitated large-scale grain imports, notably from North America. In part, also, they derived from changes in taste which increased the volume of tea, sugar and rice entering into world trade. Later in the century agrarian developments called for heavy imports of nitrates from South America. As is well known, in the growing trade in bulk-cargo carrying, the British shipping industry predominated from the 1850's to the outbreak of World War I.[4] But the increasing volume of bulk-trade made uneven demands on the shipping industry. Exports from west Europe consisted essentially of relatively compact manufactured items; imports were the bulk commodities mentioned above.[5] A part solution was found in the export of British coal.[6] But round voyages, out with coal and back with grain, etc., were not always possible. Not all manufactured items could be consigned to those centres from which imports of bulk commodities were obtained. Perhaps partly for these reasons, although probably mostly because of the general expansion in world trade in the nineteenth century, the British shipping industry developed "tramping" operations.[7] "Tramping" depended upon the availability of intermediate cargoes; an important one was found in N.S.W. coal.

The special role of the N.S.W. coal industry in its relationship with shipping lay in the provision of bulk-cargo for British ships to facilitate their transit, as freight earners, to ports whence grain, rice, tea, sugar and fertilizers, etc., were shipped to Europe. This is to suggest that, with the exception of exports to New Zealand, the overseas trade in N.S.W. coal developed primarily as a by-product

4. Parl. Papers (= P.P.) 1909, *Statistical Tables and Charts relating to British and Foreign Trade and Industry (1854-1908)* [Cd. 4954] p. 96 ff.; 1918, *Reports of the Departmental Committees appointed to consider . . . Shipping* [Cd. 9092], p. 53 ff.

5. See, for example, P.P. 1909 [Cd. 4954].

6. In 1913, for example, out of 97.2 million tons of cargo shipped from Britain, 76.7 million tons were coal. P.P. 1919, *Coal Industry Commission*, Vol. II [Cmd. 360], 805.

7. R. H. Thornton, *British Shipping* (Cambridge, 1945), p. 86; C. E. Fayle, *A Short History of the World's Shipping Industry* (London, 1933), pp. 255-6.

of the operational needs of the British shipping industry.[8] Commenting on the interwoven relationship a contemporary observer noted: "it [the N.S.W. coal export trade] depends almost wholly upon engagements of shipping to a round voyage of which it is a convenient incident that cargoes of coal should be taken from Newcastle . . . [until a reciprocal trade with Australia from the coal markets can be developed] Newcastle will be dependent for its foreign trade upon chance visits of sailing vessels made in the course of a round voyage".[9] Coal exports, other than to New Zealand, being geared to the existence in foreign markets of cargoes awaiting carriage to Europe, the direction of trade was focussed on ports from which bulk shipments to Britain were made. These ports were in Asia, the Pacific Islands, and above all on the west coast of North, Central and South America. Quinquennial averages and relative proportions of the overseas trade are shown in Appendix I.

For the British shipper seeking an intermediate cargo, N.S.W. coal was an obvious choice for a number of reasons. First, until the early twentieth century exports from Australia to Europe were insufficient to take up all the ocean-going tonnage bringing imports to Australia. Secondly, the high quality of N.S.W. coal ensured ready reception in foreign markets if the c.i.f. price, based primarily on freights, was maintained at competitive levels. Thirdly, the largest of the N.S.W. coal mining companies were registered in, and directed from, London; shippers there could with ease arrange forward contracts for coal and thus dovetail their commercial operations in the various overseas markets they exploited.[10] Some London shipowners, indeed, were concurrently directors of London-registered N.S.W. coal mining companies, with all the scope such interlocking directorates suggest.[11] Pressure of events compelled the larger of the coal com-

8. Not *all* N.S.W. coal exported went in British ships. Before 1875 about 15% to 20% of the coal shipped overseas was carried in foreign vessels, thereafter the proportion carried in British ships tended to rise. In exceptional years, however, foreign shipping played a larger part. For example, a coal "famine" in 1888 in San Francisco brought several U.S.A. ships in ballast to N.S.W. for coal, "a very unusual occurrence". (Australian Agricultural Company (= AAC) Out Despatch (=Desp.) 493, p. 391; 494, p. 414.) (This Company was one of the largest of the N.S.W. coal mining companies in the nineteenth century. Its records are housed partly in the Australian National University (= A.N.U.), partly in the Company's Newcastle office.)

9. AAC Out Desp. 582, p. 187. See also *Newcastle Morning Herald* (= N.M.H.) editorial of 10 May, 1879: "We are fully alive to the fact that in proportion to the amount of tonnage visiting our ports over and above what is required for the carrying of our colonial produce, so in proportion will our exports (sc. of coal) increase and *vice versa*". (So far as is known, the only complete set of the N.M.H. (founded in 1876 to absorb the *Newcastle Chronicle* and the *Miners' Advocate*), and of the newspapers it replaced, is to be found in the office of the newspaper.)

10. Some directors of N.S.W. coal companies are described in Articles and Memoranda of Association as "East India Merchants". (See sources listed in the following footnote.)

11. P.R.O. 31/:4142; 4720; 4867; 15,370; 19,389. 34/:531; 684; 2676; 3552. It seems probable that one of the shipowners, William Cory, may have been a member of the Cory family active in the South Wales coal carrying trade. (See J. H. Morris and L. J. Williams, *The South Wales Coal Industry, 1841-1875* (University of Wales Press, 1958).

panies registered in N.S.W. to open branch offices in London solely to arrange overseas coal sales. By the early years of the twentieth century, moreover, the entire foreign trade in N.S.W. coal was arranged in, and controlled from London.[12] Fourthly, during the latter half of the nineteenth century the Indian Ocean became a marshalling centre for disengaged vessels. Finally, and among the more important aspects, technical factors limited the use of steamships to Australasia: for many years after steam was in general use elsewhere in the world, sailing vessels retained their old importance on Australasian routes.[13] Since prevailing winds in the southern hemisphere circle the earth in an easterly direction, sailing ships preferred whenever possible to return to Europe *via* the Pacific and Cape Horn.[14] As illustrated in Appendix I, this tended to direct the larger proportion of N.S.W. coal exports to the Pacific Islands and to the west coast of the Americas.

Nevertheless, the pattern of world trade and shipping movement did not remain unaltered between 1860 and 1914; developments in commerce and carrying led to changes in emphasis. The introduction of the compound engine and greater efficiency in steam boiler construction surmounted the technical problems of steamship operation.[15] The setting up of a network of bunkering stations brought steamers increasingly to Australia and thus reduced the proportion of sailing vessels in use. Towards the end of the nineteenth century the relocation of the world's wheat industry in Australia and Canada ushered in further changes. The new role of Canada as a wheat exporter, shipping through the eastern seaboard, led to a relative decline in the importance of San Francisco grain shipments. But compensatory markets were found on the west coast of South America, onhaul cargoes being nitrates for European agriculture. In the long term of greater significance was the export of wheat from Australia to Europe which absorbed the tonnage hitherto thrown surplus by the excess of U.K. arrivals over departures and used for coal carrying.[16]

12. See my article on "The Organization of the Overseas Trade in New South Wales Coal, 1860-1914", appearing shortly in *The Economic Record*.

13. G. S. Graham, "The Ascendancy of the Sailing Ship, 1880-85", *Economic History Review* IX (1956) (74-82), 81-2. M. E. Fletcher, "The Suez Canal and World Shipping, 1869-1914", *Journal of Economic History* XVIII (1958) (556-573), 564. Steamships appeared in the overseas coal trade in the late nineties. Ten years later it was reported that "there are a good number of steamers . . . engaged to carry large cargoes [sc. of coal] for foreign ports. This class of vessel appears to be coming much more into favour by exporters of coal" (AAC Out Desp. 738, p. 6; 956, p. 5). To the principal market, Chile, sail retained its importance until 1914.

14. Graham, *loc. cit.* 82. Many epics of the "last windjammer" voyages testify to the popularity of the route *via* the Horn. See, for example, the works of Alan Villiers.

15. F. E. Hyde and J. R. Harris, *Blue Funnel* (University of Liverpool Press, 1956); Thornton, *op. cit.* Chapter I; Fayle, *op. cit.* Chapters IX and X.

16. As early as 1892 an abundant wheat harvest in South Australia with an anticipated export surplus of 400,000 tons evoked the comment that this would "attract shipping which might otherwise have taken Newcastle coal to the West

Before discussing this process at length, a brief glance at some of the incidental implications is merited. The overseas currency derived from coal exports if not within striking distance of wool earnings was nevertheless not insignificant. In 1900, when wool exports were worth about £24 million, overseas sales of coal yielded about £1 million. The supply of shipping attracted by greater variety in exports was an advantage in making it unnecessary to divert Australian resources to the creation of a merchant fleet other than for interstate transport. It is, for example, unlikely that certain commodities imported direct from Asia would have been so readily procured had return cargoes of coal not been available. Finally, the increasing volume of shipping entering Australian waters, although partly responsible for public expenditure on dock facilities, was at the same time a stimulus to the tertiary industries of the port. To a very large extent it is clear that the servicing of a growing number of ocean-going vessels compensated for reduced demand from the interstate fleet, the size of which declined relatively with the introduction of steam and the higher operating efficiency achieved.

II

Evidence to illustrate the dependence of N.S.W. coal exports on British shipping may be drawn from a variety of sources. Some are referred to elsewhere in a discussion of the organization of trade; others are examined below within the context of particular markets. A more general approach is through the statistics compiled on shipping movements. Shipping data were compiled in each of the Australian States before Federation, but they are difficult to reconcile or to aggregate, hence those for N.S.W. are here used exclusively. It seems probable, however, in the light of internal evidence for the nineteenth century and from post-1901 data, that they reflect adequately the use of shipping in eastern Australia. Most, if not all, ships entered in N.S.W. from overseas had called previously at other Australian ports and were recorded in each as an entry from overseas. Restricting the analysis to N.S.W. thus eliminates double counting.

For purposes of simplification, arrivals and departures in N.S.W. have been re-arranged in six geographical areas, five of them coinciding with the grouped destinations of coal exports, namely, the U.K., New Zealand, Asia, the Pacific, the western seaboard of North America, and similarly the western seaboard of Central and South America. Ship arrival and departure tonnages are shown in Appendix II. Discrepancies between arrivals and departures are more readily

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Coast of South America". By the early 1900's N.S.W. wheat was also entering into the export trade with similar adverse effects upon the supply of shipping for the coal trade (AAC Out Desp. 630, p. 263; 895, pp. 31-2). For the re-location of the wheat industry see E. Dunsdorfs, *The Australian Wheat-Growing Industry, 1788-1948* (Melbourne, 1956); W. P. Rutter, *Wheat Growing in Canada, the United States and the Argentine* (London, 1911); *Report of the Royal Commission on Dominion-Provincial Relations* (Ottawa, 1940).

seen in the ratios of outward to inward tonnages. These are shown in Table I, a one to one ratio indicating an exact balancing of outward and inward tonnages. Certain features are to be noted: New Zealand arrivals and departures almost exactly coincide throughout the period; arrivals from the United Kingdom, however, tend to exceed departures for the United Kingdom until the 1890's. Conversely, those for the remaining areas generally show an excess of departures over arrivals, especially up to 1900. This is particularly true for Central and South America. Only after 1901 do the ratios for Asia and the Pacific approach parity and that for North America move below one. For Central and South America the excess of departures over arrivals persists until 1913; in that year the tonnage cleared was about three times that entered. Better illustrating the importance to sailing vessels of the "Roaring Forties" is, on the one hand, the predominance of sail in the tonnage cleared to the west coast of South America and, on the other, the arrival of sailers in ballast from the eastern seaboard of South America. In 1913, when on other routes sail provided a mere 4% of outward tonnage, to South America it was as high as 50%. In 1909 the comparable figure was 84%; until after 1901 *all* ships cleared to South America were sailing vessels. Of more interest perhaps is the growing number of arrivals in N.S.W. of British sailing vessels in ballast from Brazil and the Argentine. It seems probable that, having discharged British coal in these markets, the vessels took advantage of prevailing winds to reach N.S.W. and, again loading with coal, used the same winds to circle the earth to the west coast of South America for a Europe-bound cargo.

Generally speaking the total tonnage entered shows a consistent rise each year. A notable exception is the 1890 decade when shipping and, as a consequence, the overseas coal trade, were depressed. The association between the two is commented upon during the depression in these terms: the coal trade is very dull, the observer notes, "not for want of orders but from the scarcity of shipping available for foreign ports. I am told that to a large extent this is caused by the lessened imports into the Australian colonies especially of the heavy materials required in the carrying out of government works".[17]

If N.S.W. coal exports are considered from the viewpoint of shipping direction three main areas may be distinguished: the trans-Pacific, Asia, and New Zealand. Consignments to New Zealand on average account for about 20% of the total, being higher until the early 1880's and thereafter generally lower. But the New Zealand trade appears to have little connection with the coal-shipping relationship forming the subject of this article. Arrival and departure tonnage almost exactly coincide throughout the period and internal evidence suggests that the fleet regularly employed on this sector of trade was owned partly in New Zealand and partly in the eastern Australian

17. AAC Out Desp. 551, p. 358, and cf. 617, p. 125 ff.

TABLE I

Ratio of Outward to Inward Tonnages

Year	N. Zealand	Pacific	Asia	N. America	C. & S.A.	U.K.
1861	1·0	1·1	2·1	1·1	13·0	0·5
1865	1·0	1·8	3·5	1·8	1·7	0·6
1869	0·9	1·1	5·0	7·5	10·0	0·6
1873	0·8	1·3	4·7	8·1	0·4	0·4
1877	1·0	1·5	4·8	2·6	7·0	0·4
1881	1·1	1·6	1·9	2·7	7·0	0·5
1885	0·9	1·6	3·5	1·9	20·0	0·5
1889	1·1	1·9	2·7	3·3	68·0	0·7
1893	1·1	1·4	1·1	2·6	115·0	1·0
1897	1·2	1·8	1·4	1·5	16·4	1·0
1901	1·1	2·5	0·9	1·3	15·5	1·0
1905	1·1	0·9	1·7	0·6	6·0	1·1
1909	1·1	1·2	1·2	0·3	2·5	1·2
1913	1·2	1·0	1·5	0·5	3·0	1·0

States. Hence its operation may properly be examined in a study of the coastal or interstate trade and here safely ignored.

The two remaining areas, Asia and the trans-Pacific, shared on average about 80% of the total export trade. Throughout the 1860's the lion's share went to Asia; during the 1870's the two areas vied for supremacy, the trans-Pacific markets exceeding Asian in six out of the eleven years 1870-1880. From the early 1880's trans-Pacific consignments exceed 50% of the total (New Zealand being excluded), and from the early 1890's about three-quarters of all shipments crossed the Pacific. Moreover, the arbitrary boundary which in the present study has been imposed between the Asia and trans-Pacific areas tends to minimize the full significance of the easterly route to Europe *via* Cape Horn. As discussed in the appropriate section below, a goodly share of Asian shipments (at least until the mid-1900's) went to China, mainly Hong Kong and Shanghai, the on-route to Europe for such vessels being *via* the Horn.

The trans-Pacific area was made up of three markets: North America, Central and South America, and the islands of the Pacific; each had its heyday. The North American market flourished from the beginning of the period until the late 1890's, when it declined. The Central and South American market rose in importance after the early 1890's. Shipments to the Pacific Islands rose relatively and absolutely during the late 1890's and the first decade of the twentieth century.

The North American market was virtually San Francisco, although shipments were sometimes made to ports farther north. Abundant literary evidence attests to the closeness of the association between on-cargoes of grain from San Francisco for Europe and the volume of N.S.W. coal imports.[18] Commenting on the heavy foreign coal receipts in 1881 the San Francisco *Journal of Commerce* noted:

18. On the importance of San Francisco and the Pacific North-west in the world grain trade see J. S. Davis *et al.* "Pacific North-west Wheat Problems and the Export Subsidy", *Wheat Studies,* X (1933-4) (353-426), 361-9.

"the chief cause of the heavy importation of foreign coal is to be found in the great wheat fleet which diverted its course hither last year. The vessels of which it was composed, most of them brought coal as ballast and even a slight advance on the original cost price paid then".[19] Some two years later, a merchant house in San Francisco, writing in February to a N.S.W. colliery company, stated that "if we are favoured with heavy rains during the next two months . . . [this] will by securing large crops and high outward freights draw disengaged vessels in this direction".[20] (It is perhaps noteworthy that the tenor of this and similar comments suggests that supply anticipated demand in the provision of shipping.) As late as 1893, when the emphasis in the trade with the Americas had already begun to move south to the nitrate ports, it was said that "the permanence of the demand for Australian coal in San Francisco . . . is clearly wholly dependent upon the freights obtainable for wheat cargoes from California".[21] Poor freight expectations, in contrast, drew vessels to other markets. The indifferent harvest of 1877, for example, prompted a San Francisco merchant to note that it "has and will have a tendency to prevent vessels coming this way with coal".[22]

The Central and South American market was dominated by shipments to Chile. For the sample years from 1881 onwards, over 80% of the total in eight out of nine years went to Chile, in four of the sample years the figure exceeded 85%. A poor second was Peru which took most of the remainder. It was a late-developing market and, as elsewhere with the N.S.W. coal trade, depended upon the prior existence or the fostering of a significant bulk export trade with Europe. Early indications suggested that one might be found in guano, but the trade failed to grow, possibly because of the activities of U.S.A. shippers in the guano area.[23] Not until the 1880's was a suitable commodity found in nitrates and hence imports of N.S.W. coal began to assume sizeable dimensions. As late as 1878 a freight enquiry from a San Francisco merchant elicited the following reply: "very little coal is sent from here to Callao. As vessels going there could only look for a guano cargo there might be some difficulty in obtaining a charter." As for Lima, the writer continued, the last shipment there had been three years earlier, and that only a trial cargo arranged by the Sydney gas engineer who had built the Lima gas works.[24] Within a decade shipments began to soar as European agricultural interests turned increasingly to the nitrates obtained from Chile.[25] By the

19. Quoted N.S.W. Dept. of Mines *Annual Report 1881*, pp. 119-20.
20. AAC CC-AD 15.
21. *Ibid.* Out Desp. 644, p. 412.
22. *Ibid.* ADM 2, 3.
23. R. A. Rydell, *Cape Horn to the Pacific* (University of California Press, 1952), pp. 144-5.
24. AAC General Superintendent's Out Letters (= G.S. O/L) 29 January, 1878, to A. D. Moore.
25. M. Lamer, *The World Fertilizer Economy* (Stanford University Press, 1957); *The Mineral Industry* (New York and London), see Vol. VII (1899) *et seq.* for production and exports of nitrates; Imperial Mineral Resources Bureau, Reports on the Mineral Industry etc. *Nitrates (1913-19)* (London, 1920).

late 1890's consignments to this market were regularly surpassing those to North America as ships were diverted from San Francisco to Valparaiso.

Similar comments illustrate the relationship between coal and shipping. A Liverpool merchant forecast a probable contraction in the South American trade in 1896 in these words: "the nitrate trade is exceedingly dull . . . consequently the requirements of coal there will be very much less than in 1895".[26] In his freight report for November 1903 the principal Newcastle shipping agent made the point that the outlook for the N.S.W. coal trade was very gloomy because "the prospects for nitrate loading are not sufficiently good to induce shipowners to fix in this direction". As for the market to the north, he goes on, "business with San Francisco appears to have almost ceased . . . the possibility of this trade reviving is somewhat remote".[27] In the following month the scarcity of shipping for coal was said to be "because present rates home from the West Coast leave absolutely a loss on that voyage".[28]

The Pacific Islands formed the least important market of the three trans-Pacific groups. In only three of the sample years between 1861 and 1913 did the share of the total claimed by this market exceed 20%, in only six did it rise above 15%. In absolute figures, exports in no year reached a half-million tons. It was much less concentrated and no single importing centre exerted continuous dominance. The three major elements making up the market were the Philippines, the Hawaiian Islands, and the South Sea Islands. The Philippines were the largest importer over the longest period; the volume of shipments noticeably increases after the annexation of the islands by the U.S.A.[29] This market shared first place with the Hawaiian Islands, the South Sea Islands making a poor third except in the opening and closing years of the period under examination.

Finally there is the Asian market. Although, as we have seen, it was less important than the trans-Pacific market, it nevertheless accounted for a large proportion of the N.S.W. coal trade, more especially in the early years. Unlike the Americas, where on-cargoes consisted of single commodities, the back-trade of Asia was very varied. Bulk cargoes for Europe consisted of silk, rice, tea (from both China and later India), hemp, jute, cotton, indigo and so on. The principal consumption centre until the early eighties was China (mainly Hong Kong and Shanghai), taking between 60% and 80%; thereafter the proportion declined sharply to less than 30%. More noticeable is that actual quantities shipped to China also declined below the level of the eighties. Coinciding with the decline of China as a consumer was a steady if unspectacular advance in exports to

26. AAC In Desp. 766, memo annexed. Nitrate exports were indeed lower in 1896 (*The Mineral Industry*, Vol. VII).
27. R. B. Wallace, *Freight Report*, 3 November, 1903 (A.N.U. Archives).
28. AAC In Desp. 880, p. 5.
29. Cf. AAC Out Desp. 895, p. 36.

Singapore, to the Netherlands East Indies, and also, for a time, to India.

In the early years, when China imported most of the coal consigned to Asia, it is clear that this trade, like the trans-Pacific, was an integral part of the "tramping" operations of British shipping. An editorial in the *Newcastle Chronicle* in 1864 laments the discovery of coal in China for its likely effects on N.S.W.: "Hitherto, when the wool season was over, vessels which had discharged their inward cargo at Sydney or other ports, rather than go seeking freight in ballast have not hesitated to load with coal for the East, being tolerably sure of a market there for it, and relying on the many opportunities which present themselves, of procuring loading for Great Britain".[30] In the event these forebodings were justified, if not for the reason given, and exports to China contracted. Even with the decline of exports to China, however, the part played by N.S.W. coal shipments to the Asian sector remained essentially that of providing freight-earning cargo for vessels which otherwise would have cleared in ballast. Not until after 1900, as illustrated in Table I, when arrival tonnages began to balance departures, was the role of the N.S.W. coal trade with Asia radically altered.

The two factors underlying initially the decline of shipments to China and ultimately the transformation of the Asian trade were competition (discussed below) and the opening of the Suez Canal. The shortened route to the east, and the successful pioneering of the compound engine by Holt, brought steamships into Far Eastern commerce.[31] The key to the China trade was a speedy voyage home to skim the cream of the London tea market. It is thus not surprising that in the China trade steamers quickly replaced sailors,[32] nor that "by the end of the seventies the last of the clippers were driven from the China tea trade".[33] Other high-bulk low-value commodities originating in Asia were less rapidly affected. Sail as a percentage of all tonnage cleared for Asia until the 1890's remained consistently higher than the corresponding percentage entered, a discrepancy paralleled in figures of total tonnages entered and cleared. Towards the end of the nineties, however, Asian coal shipments had altered from being cargoes taken in lieu of ballast to being cargoes for which ships were prepared to sail in ballast *from* Asian ports to N.S.W. to obtain. Before the 1890's few ships arrived in ballast from Asia, from then both the proportion and actual tonnage figures of ballast arrivals

30. Issue of 10 February 1864, cf. that of 13 August 1864. In the same year a shipping agent pointed out in connection with the Singapore market that consignments on ship account predominated to that port "it is but seldom vessels go there chartered, in most cases they take on ships' account" (AAC CC-N 40). For the year 1885 it was noted that "Australia . . . barely kept employed the usual liners, outside boats having had to leave with coals at low figures [sc. freights] for India to find homeward employment during the greater part of the year". (E. A. V. Angier) *Fifty Years' Freights, 1869-1919* (London, 1920), p. 66.

31. Hyde and Harris, *op. cit.* p. 21.

32. *Ibid.*, pp. 37-8.

33. Fletcher, *loc. cit.*, 561.

began to rise, often exceeding 30% of all arrivals. Very largely this reflects the part played by the N.S.W. coal industry in supplying the new and growing bunkering station of Singapore. Equally noticeable is the virtual disappearance of the gap between arrival and departure tonnages after the turn of the century.

III

Explanation of the N.S.W. export trade in coal so far has been in terms of the "tramping" requirements of British shipping. The availability of ships by itself, however, did not permit the trade to develop in face of competition from other coal producing countries, notably from Britain, Japan, British Columbia and India. A major factor in the successful disposal of N.S.W. coal overseas was its landed cost in relation to that of competing coals in foreign markets. The cost advantage enjoyed by N.S.W. coal, as already stated, derived from the cheap coal freights secured from its association with the British shipping industry. Comprehensive data for all competing coals unfortunately are not available. Comparison is, however, possible with the British coal industry, the most formidable competitor encountered by N.S.W. in all its overseas markets throughout the period.

The relationship of N.S.W. and British coal in common markets is illustrated in Table II below. The details show that in all but three of the sample years, British totals exceed those of N.S.W. They nevertheless testify to the striking success achieved by N.S.W. in expanding exports from less than 50,000 tons to over one and a half million against such a long-established and powerful rival. Moreover, they record the impressive rate of growth in the N.S.W. coal export trade. Conversely, the table shows that after the early eighties the rise in the volume of British coal exports to these markets was halted and the trend reversed; at the same time, the proportion of the British coal trade claimed by these markets contracted from 11% in 1881 to 2% by 1912.[34]

The rise of the N.S.W. export trade was made possible by the relatively lower landed cost of the coal in foreign markets. As demonstrated below, this was due fundamentally to lower freights. It is of some interest, however, to compare other elements embodied in the c.i.f. price, namely, raising costs, f.o.b. prices, and the margin between the two representing land transport and handling charges; these are shown in Appendix III. It will be noted that raising costs tended to be higher in N.S.W. (25 of the 43 years); they were in fact probably higher over a longer period, the N.S.W. data shown in Appendix III being true raising costs, those for the U.K. being "the average selling value per ton of coal raised at pit". On the other hand, f.o.b.

34. In 1903 it was noted that Welsh coal had been ousted from the Philippines and the Dutch East Indies by N.S.W. coal. Three years later the same source reported that the demand in Britain for shipping for coal exports to the east had declined because of the growing use there of Australian, Indian and Japanese coal (Angier, *op. cit.*, pp. 112, 122).

TABLE II

Coal Exports from N.S.W. and the U.K. to Identical Markets, 1861 - 1912 (sample years)

	N.S.W. ('000 tons)	U.K. ('000 tons)	% of total U.K. exports to these markets
1861	44	486	6·4
1865	90	659	7·4
1869	254	796	7·7
1873	347	1,054	8·7
1877	352	1,468	9·9
1881	373	2,055	11·0
1885	764	1,897	8·4
1889	1,091	1,539	5·6
1893	675	1,623	5·9
1897	1,198	1,098	3·1
1901	1,340	1,208	2·9
1905	1,647	n.a.	n.a.
1909	1,340	n.a.	n.a.
1912	1,763	1,414	2·2

Figures for N.S.W. exclude consignments to New Zealand but include all others. Figures for the U.K. relate to consignments to: India, the Far East and Pacific Islands, and the Pacific coast of the Americas. Source for U.K. figures: D. A. Thomas, "The Growth and Direction of our Foreign Trade in Coal during the last half-century", *Journal Royal Statistical Society*, LXVI (439-522), 508; data for 1912 from H. S. Jevons, *The British Coal Trade* (London, 1920), p. 683 (the year 1912 witnessed the National Coal Strike in Britain). Data for 1912 adjusted to exclude shipments to Africa from the U.K.

prices tended to be higher in the U.K. (27 of the 43 years). This suggests for the U.K., where intense competition prevailed, that on the whole coal producers there were faced with heavier charges in moving coal to the docks. The discrepancy in land handling charges was indeed higher; in Newcastle (N.S.W.) rail traction and loading charges from pit-head to ship's hold were less than one shilling per ton. The bulk of the margin in N.S.W. represents monopoly profits accruing to coal producers when associated in the Northern Vend.[35] It is significant that the margin usually exceeds 50% of raising costs during the years when the Vend was in existence. Actual profits per ton in Britain between 1899 and 1913 never exceeded 1/8d; in N.S.W. the upper limit was 3/0d, during the seventies it had reached 4/8d.[36] But higher profits and raising costs in N.S.W. were more than outweighed by lower freights.

Four sets of freight rates helped to determine the price of N.S.W. coal and the quantity shipped to any one market: the outward freights earned by a ship to its first major port of discharge (by the early

35. The Northern Vend or Northern Colliery Association was the Newcastle coal producers' association. It existed during the years 1872-9, 1882-92, 1900-13.

36. P.P. 1919, *Coal Industry Commission* [Cmd. 361] Vol. III, Appendix 5, cf. P.P. 1926, *Report of the Royal Commission on the Coal Industry* [Cmd. 2600] Vol. I, 218, which refers to 1/- per ton "as the normal profit of coal mining before the war". AAC Out Desp. *seriatim*.

twentieth century not necessarily in Australia); the rate from a competing coal producing country to a coal market also being supplied by N.S.W.; the initial rate from Newcastle to coal markets; and, often more limiting, the on-freight from the coal discharge port to Europe. For the earlier years, when consignment on ship account was more common and before the marketing pattern was dominated by contracts arranged in London, short-term variations in the initial rate from Newcastle and especially in the final rate for Europe would appear to have exerted a more immediate influence. As illustrated above by quotations, commercial intelligence from overseas reporting a bumper harvest and the prospect of high freights for Europe was a summoning herald to disengaged vessels. The resulting competition among ships and shipping agents, for coal cargoes to carry to the port whence high homeward freights were to be obtained, bid down the rate from Newcastle to that port; on one occasion they were halved almost overnight.

In contrast, when back-loading prospects were only average, or in later years when the trade was more highly organized, and round-voyage charters arranged in London were more common, short-run fluctuations were less important.[37] In the long term, direct coal exports from Britain were clearly at a disadvantage as compared with shipments from N.S.W. This is not unreasonable. Coal is a high-bulk low-value commodity; it cannot sustain high transport charges. Hence, as a rule, the greater the distance over which it is carried, the cheaper the ton-mile rate.[38] But a lower ton-mile rate is offset by other factors. A ship cleared with coal from Cardiff for, say, Hong Kong obviously had lower earning capacity than one cleared with general cargo (bearing higher freights) for Australia and subsequently despatched to Hong Kong with N.S.W. coal. On the other hand, as contemporary complaint attests, variations in demand for tonnage in Britain could, and on occasions evidently did, force down the outward rate to competitive levels.

The importance of freight in the landed cost is demonstrated in Appendix III for the Singapore market (for which comparison over a number of years is possible). The contribution made by freights to the excess of the U.K. over the N.S.W. landed price is at once obvious.[39] As a local commentator noted, "it is less the price of the coal [sc. British] than the price of freights which affects us".[40]

Contemporary comment in a variety of sources stresses that the freight element was the prime factor in improving or worsening the competitive position of a coal exporter. As early as 1864 and at frequent intervals until as late as 1910, despatches passing between the London and N.S.W. offices of the Australian Agricultural Com-

37. By the early years of the twentieth century, moreover, voyage charters from Australian ports were giving way to time charters. Charter periods sometimes were as long as three years (Angier, *op. cit. passim*).

38. H. S. Jevons, *The British Coal Trade* (London, 1920), p. 690 ff.

39. The sources used to construct the freight series in Appendix III reveal similar trends for Bombay and Hong Kong.

40. AAC Out Desp. 263, pp. 300-1.

pany (one of the largest N.S.W. coal companies) dwell on movements in freight rates and their beneficial or adverse effect upon N.S.W. coal exports. Similar observations are sprinkled in local newspapers and in the *Colliery Guardian,* the journal of the British coal industry.

The volume of complaint from N.S.W. about British competition is loudest in the 1870's, the 1890's, and in the early 1900's. That of the seventies is connected with the expansion, both absolute and relative, of British exports to Far Eastern markets. This expansion occurred at a time when differentials in freights from N.S.W. and Britain were narrow and when the trade association of N.S.W. coal producers was experimenting with systems of controls. In the nineties, depression in eastern Australia coincided with the 1891-4 slump in the freight market generally. A fall in import demand in Australia reduced the volume of ocean-going tonnage available for coal carrying and tended to force up rates. At the same time the worldwide fall in freights enabled British coal to be carried more cheaply. A shipping agent's circular in 1892 explains the fall in N.S.W. coal exports to the Far East by reference to the decline in outward freights from England "which permitted United Kingdom coal to be landed at prices which made successful competition very difficult for Australian coal".[41] Support for this statement may be found in Appendix III, which shows that for some years during the nineties the difference in freights was small. A decade earlier the margin had been 13/8.

Complaint in the early years of the present century stemmed similarly from the narrowing of freight differentials.[42] In part this was due to a fall in freights from Britain, in part from rising demand in Australia for tonnage for Europe. The Sydney correspondent of the *Colliery Guardian* in January 1905 drew attention to the low c.i.f. price of British coal in San Francisco, namely, 23/- including freight charges of only 11/- compared with a freight rate alone of 17/6 from Newcastle. In Australia the growing importance of wheat exports to Europe pressed upon available shipping space. Good harvest prospects in Australia in 1903-4 diverted shipping from the coal trade, ship charterers and "owners prefer grain [sc. to Europe], not only because of the higher rate but because present rates home from the West Coast [sc. of South America] leave absolutely a loss on that voyage".[43] In 1907, when the freight on wheat from Australia to Britain was 27/6, it was pointed out that "with rates like these there is little hope of cheaper freights to the West Coast of South America".[44] In 1909, when N.S.W. exports were 33% down on 1908 figures, it was urged from Newcastle that any lowering of the N.S.W.

41. J. & A. Brown's *Freight Report,* 23 January, 1892 (A.N.U. Archives).

42. Over the period 1850-1913 freights tended to fall, see E. S. Gregg, "Vicissitudes in the Shipping Trade, 1870-1920", *Quarterly Journal of Economics* XXXV (1920-1) (603-17); D. North, "Ocean Freights and Economic Development, 1750-1913", *Journ. Econ. Hist.* XVIII (537-55).

43. AAC In Desp. 880, p. 5.

44. *Ibid.,* 930, p. 6.

c.i.f. price overseas must come from freights: "this can only be done through the action of the London Board in reducing competition for freights".[45] But freight rates could not be lowered indefinitely without affecting the supply of shipping. Two years later (exports then being 30% lower than in 1908) slackness in the export trade was said to be caused by low freights and few ships; "the scarcity is to a large extent due to owners of sailing vessels preferring to lay their vessels up rather than make heavy losses at rates necessary to meet the market".[46]

Developments in the British coal industry, on the other hand, materially assisted the N.S.W. industry from time to time. Increased labour charges in British mining tended to weaken the competitive position of British coal overseas as in the late sixties and more especially in the early seventies when rising costs coincided with mounting domestic demand to force up prices.[47] Labour disputes in Britain had a more profound effect upon the fortunes of N.S.W. miners. The 1898 strike in South Wales, or the more telling national strike in 1912, were accompanied by increased exports from N.S.W., for the latter year a rise of 20% on the previous year was recorded.[48] It is a nice touch of irony that out of his increased earnings the N.S.W. miner contributed to the British miners' strike fund.

A second competitor in many of the markets supplied by N.S.W. was the coal industry of Japan. Begun with the Meiji Restoration, Japanese coal mining experienced two periods of major growth following the wars with China and Russia.[49] Some figures for output and exports are:

	Output (Mill. metric tons)	Exports (Mill. metric tons)
1874	0·2	
1893	3·2	0·8
1896	5·1	1·4
1903	10·1	(over 3 million tons)
1909	14·8	
1913	21·7	3·5

Cheap Japanese coal as early as the eighties was penetrating the markets of China, India and Singapore. In 1894 the *Straits Times* of Singapore remarks on the encroachment of Japanese coal in that market. In the same year two shipping companies, the P. & O. Line and the China Steam Navigation Company, in their annual reports refer to the growing use of Japanese coal for bunkering in the Far

45. *Ibid.*, Out Desp. 987, p. 11.
46. *Ibid.*, In Desp. 966, p. 5.
47. *Ibid.*, 299, p. 5; 307, p. 4.
48. *Ibid.*, 959, p. 4; Out Desp. 768, p. 8; Jevons, *op. cit.*, p. 533 ff. Before the strike had actually begun the competitive position of N.S.W. coal was strengthened when stock-piling in anticipation of the strike forced up coal freights from Britain (Angier, *op cit.*, p. 137).
49. For some account of coal mining in Japan see W. W. Lockwood, *The Economic Development of Japan* (Princeton University Press, 1954); T. C. Smith, *Political Change and Industrial Development in Japan: Government Enterprise, 1868-1880* (Stanford University Press, 1955).

East. The latter company, indeed, goes so far as to attribute its ability to pay a dividend to lower fuel charges accompanying their switch to Japanese coal east of Suez.[50] In trans-Pacific markets competition from Japanese coal was initially less significant except when labour disputes in N.S.W. interrupted supplies. But by the early years of the twentieth century Japanese coal was finding its way into the Pacific Islands markets, being carried in both British and German ships at low rates of freight, and "in more than one instance it has been used as ballast".[51] In Manila in 1903, for example, the c.i.f. price of Japanese coal was 17/-; the f.o.b. price at Newcastle then was 10/- and freights alone amounted to 10/-. During World War I, Japan changed from a net exporter to a net importer of coal as its own domestic demand increased.[52] Its withdrawal from the overseas trade in coal unfortunately came too late to affect the fortunes of the N.S.W. coal industry.

The remaining two competitors who merit attention are India and British Columbia. The latter was encountered in a single market only, San Francisco; its competitive strength, however, was such as ultimately to drive out N.S.W. coal. Table III gives details of the role of British Columbia in the San Francisco market up to 1914. Before 1893 supplies obtained from there account for about 30% of total imports; between 1900 and 1914 the proportion had risen to three-quarters; from 1916 onwards it regularly exceeded 90%.[53] Coal mining in India was important, partly in replacing imports previously obtained in some measure from N.S.W., but mostly on account of its intrusion as a competitor in the markets of Ceylon and Singapore. When India was still a net importer of coal the bulk of her supplies came from Great Britain;[54] of the remainder an amount rarely exceeding 100,000 tons a year come from N.S.W. But as imports into India declined (from about three-quarters of a million tons in 1893 to less than half a million in 1913), so her exports rose from less than 5,000 tons in 1891 to a quarter-million in 1897, and to three-quarters of a million by 1913.[55] Moreover, the bulk of her export trade was with Ceylon and Singapore.

A word may be said in conclusion about the significance of N.S.W. in the supply of the San Francisco and Chile coal markets. Information about San Francisco is set out in Table III. The quinquennial averages show that foreign imports contributed to the total supply varying amounts between 34% and 59%, on average about one-half of total coal requirements were imported. Of the quantity received from overseas, that obtained from N.S.W. ranged from as little as

50. *Colliery Guardian*, LXVII, 546, 706, 1184.
51. *Ibid.*, LXXXVI, 678.
52. Lockwood, *op. cit.*, pp. 359-60.
53. *The Mineral Industry*, Vol. X onwards.
54. J. Guhathakurta, "The Indian Coal Trade" (unpublished London M.Sc. (Econ.) thesis 1937, p. 63).
55. *Statistical Abstract for British India*, prepared by the Commercial Intelligence Dept. of India, 1906 [Cd. 3166], and 1916 [Cd. 8157].

9% to as much as 70%, with a tendency to decline after 1900 when, as noted above, British Columbia coal began to dominate the market.

TABLE III

The San Francisco Coal Supply
(Quinquennial Averages)

	Total coal supply	% of total supply imported	% of total supplied by N.S.W.	% of imports received from N.S.W.	% of imports received from British Columbia
	('000 tons)	%	%	%	%
1861-1865	134	34	8	24	23
1866-1870	275	34	19	57	17
1871-1875	449	42	22	51	21
1876-1880	615	50	16	32	45
1881-1885	905	57	17	30	35
1886-1890	1322	59	20	33	42
1891-1895	1998	55	13	23	54
1896-1900	1560	53	13	23	62
1901-1905	1202	55	14	26	57
1906-1910	?	?	?	17	77
1911-1914	?	?	?	14	80

The Chile market is less well documented. Statistics of domestic production apparently were not being compiled as late as 1904 when, it was estimated, local coal mining contributed about 775,000 tons to the total supply; imports in this year amounted to 914,000 tons.[56] Imports were supplied almost exclusively by Britain and N.S.W. For those years shown below for which some data are available it will be seen that about half the quantity imported came from N.S.W.[57]

TABLE IV

Chile Coal Imports
('000 tons)

	Total imports	% from N.S.W.		Total imports	% from N.S.W.
1888	442	21	1898	575	55
1889	326	49	1899	661	53
1890	404	37	1900	675	60
1891	481	40	1901	891	56
1892	362	50	1902	830	48
1893	401	37	1903	810	60
1894	605	43	1904	914	50
1895	655	41	1905	1092	45
1896	619	53	1906	1058	53
1897	534	65	1907	1555	55

56. Foreign Office, *Diplomatic and Consular Reports on Trade and Finance* (Annual Series), No. 3465, p. 21.

57. *Ibid.* Annual Reports for Chile 1889-1908. *The Mineral Industry*, Vol. VII *et seq.*, suggests that the proportion claimed by N.S.W. for the years 1894-9 was as high as 75 per cent.

The outbreak of war in 1914 brought the overseas coal trade to an abrupt halt. Although before the end of the war there was some revival, the industry awaited the return of peace to restore its markets. Post-war recovery of exports, delayed initially in satisfying pent-up interstate demand, seemed by 1921 to be assured when the 1913 total was almost reached. The promise was never fulfilled. With temporary relief in certain years exports dwindled steadily.

The disappearance of the export trade in coal was largely owing to the expansion of Australian wool and wheat exports. To a lesser extent also it derived from post-war developments in the Australian manufacturing industries which tended to hold back a rise in imports.[58] Their combined effect was to even out the supply of, and the demand for, ocean-going tonnage in Australia, and consequently to eliminate the surplus upon which the pre-war export trade in coal had depended. Moreover, from 1925-6, apparently the first recorded year, the tonnage of exports is noticeably in excess of imports.[59] This reversal of pre-war experience reacted in two ways. First, since return cargoes for Europe were now more certain, British shippers (as late as 1930 still handling 75% of the Australian import-export trade) were encouraged to introduce scheduled voyages. A feature of the twenties is the appearance of a number of cargo liners offering stable freights, regular voyages, and deferred rebates to make the freight rates more palatable to local users.[60] Secondly, since tramp ships were able to obtain ample cargoes direct to Europe, there was little inducement to carry N.S.W. coal as an intermediate cargo except at high rates of freight. Under such conditions coal ceased to be shipped. It is noteworthy that British coal exports in 1929, although lower than in 1913, were nevertheless 62% of the 1913 total; N.S.W. exports in the same year were only 15% of the 1913 figure.[61] For a time increased bunkering demand for overseas vessels acted as a palliative. But with the switch to oil fuel this market also declined. From then on the export trade in coal contracted sharply, and the N.S.W. coal industry stagnated until the outbreak of World War II inflated domestic demand.

K. H. Burley

Australian National University.

58. C. Forster, "Industrial Development in Australia, 1920-1930" (unpublished A.N.U. Ph.D. thesis, 1959), pp. 47, 280.

59. Commonwealth of Australia, *Year Book* (1930), p. 164.

60. See the various Reports of Departmental etc. Committees on shipping, *e.g.* P.P. 1923 [Cmd. 1802], Appendix II, 32, 37, 43, etc.; Australian Overseas Transport Association, *Oversea Shipping Contracts* (Sydney, 1930); J. B. Brigden, "Australian Oversea Shipping", *Economic Record Supplement* (1930) (173-190); D. Marx, *International Shipping Cartels: A Study of Industrial Self-Regulation by Shipping Conferences* (Princeton University Press, 1953), pp. 93-96.

61. N.S.W. Leg. Assembly, *Report of the Royal Commission . . . into . . . the Coal Industry* (1930), p. 260. Imperial Mineral Resources Bureau, *Statistics* for the years 1920-1930.

APPENDIX I

Distribution of Coal Exports, 1861 – 1914/5

(Quinquennial averages)

Period	Total exported ('000 tons)	Percentage to:—				
		New Zealand	Pacific Islands	Asia	North America	Central & South America
		%	%	%	%	%
1861–1865	138	39.3	5.8	35.7	10.6	1.2
1866–1870	304	29.4	6.7	42.7	17.4	1.9
1871–1875	441	26.4	10.0	36.8	24.1	0.8
1876–1880	487	32.6	10.3	33.0	21.7	1.2
1881–1885	764	21.7	10.9	33.6	25.4	6.6
1886–1890	970	16.1	9.9	24.5	35.0	13.5
1891–1895	1,027	15.5	13.0	17.2	27.3	25.1
1896–1900	1,374	12.4	17.1	19.5	17.1	32.7
1901–1905	1,721	15.2	23.5	13.6	11.6	32.9
1906–1910	2,108	11.3	19.6	19.9	10.8	38.0
1911–1914/5	1,827	19.6	13.2	21.8	7.1	38.0

Source: *N.S.W. Statistical Registers,* except for 1903 which are from *The N.S.W. Year Book.* After 1913 the calendar year changes to the financial year.

Appendix II

Tonnage of Ships Entered and Cleared in N.S.W., 1861 – 1913

('000 tons)

Year	Total		U.K.		New Zealand		Asia		Pacific Islands		North America		Central & South America	
	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out
1861														
Cargo	273	344	55	27	24	45	28	47	14	14	15	14	1	8
Ballast	94	36	—	—	21	1	—	11	1	2	—	2	—	5
Total	366	380	55	27	45	45	28	58	15	16	15	16	1	13
1865														
Cargo	427	639	71	39	45	116	18	56	9	17	12	18	10	7
Ballast	209	52	—	1	76	5	—	7	1	3	—	3	—	10
Total	636	690	71	39	121	121	18	63	11	20	12	21	10	17
1869														
Cargo	461	803	84	51	43	92	25	126	15	21	10	74	—	7
Ballast	281	30	—	—	68	5	1	5	5	1	—	1	—	3
Total	741	833	84	51	111	96	26	131	20	22	10	75	—	10
1873														
Cargo	559	878	101	44	52	105	33	159	27	53	9	72	—	4
Ballast	316	10	—	—	75	1	1	—	15	2	—	1	10	—
Total	875	888	101	44	127	106	34	159	42	54	9	73	10	4
1877														
Cargo	841	1,093	170	63	78	148	34	161	33	58	45	114	—	7
Ballast	296	8	—	—	73	1	—	2	8	—	—	1	—	1
Total	1,136	1,102	170	63	150	149	34	163	40	58	45	116	—	7
1881														
Cargo	1,185	1,325	299	161	74	127	83	161	45	88	55	146	—	7
Ballast	271	5	—	—	37	—	3	1	10	—	—	—	—	—
Total	1,456	1,330	299	161	111	127	86	162	55	88	55	146	—	7
1885														
Cargo	1,743	1,991	432	233	149	155	71	239	86	154	101	184	—	59
Ballast	345	53	—	—	23	4	4	20	11	—	—	6	2	1
Total	2,088	2,045	432	233	172	159	75	259	97	154	101	189	2	60
1889														
Cargo	1,928	2,623	416	274	156	164	104	269	89	169	93	309	2	134
Ballast	704	66	—	—	7	17	—	8	7	13	—	1	—	2
Total	2,632	2,689	416	274	164	180	104	276	96	181	93	310	2	136
1893														
Cargo	1,969	2,545	392	376	151	202	84	117	113	170	75	192	—	115
Ballast	621	59	4	5	31	1	27	—	17	11	—	—	—	—
Total	2,590	2,603	397	381	182	203	111	117	130	182	75	192	—	115
1897														
Cargo	2,426	3,332	434	421	194	250	108	189	123	223	152	233	1	261
Ballast	906	80	4	4	21	10	30	—	9	11	6	4	15	2
Total	3,332	3,413	438	425	215	260	138	189	132	234	158	237	16	263
1901														
Cargo	2,940	4,109	558	599	260	344	146	179	129	343	276	224	4	325
Ballast	1,256	216	9	—	67	26	64	2	16	15	2	1	17	—
Total	4,196	4,325	567	599	328	371	210	181	145	358	278	225	21	325
1905														
Cargo	1,772	2,652	646	702	326	434	125	317	207	375	249	182	1	360
Ballast	550	65	15	11	87	17	61	5	229	15	85	8	59	2
Total	2,322	2,717	661	713	413	451	186	322	436	390	334	190	60	362
1909														
Cargo	2,336	3,007	834	962	396	517	189	284	315	504	279	115	4	317
Ballast	547	108	10	27	99	24	67	13	121	10	61	2	127	7
Total	2,883	3,114	844	989	495	541	256	297	436	514	340	117	131	324
1913														
Cargo	3,315	3,995	1,148	1,211	471	761	215	371	401	442	549	252	13	438
Ballast	558	66	15	—	206	15	48	17	58	30	14	4	134	—
Total	3,873	4,061	1,163	1,211	677	776	263	388	460	472	563	256	147	438

Source: *N.S.W. Statistical Register*
(Apparent errors in addition are due to rounding.)

APPENDIX III

Comparative Costs and Freights

Year	New South Wales				United Kingdom			
	Raising costs	Margin between raising costs & f.o.b. price	Freights to Singapore	Apparent landed cost in Singapore	Average pit-head values as % of N.S.W. raising costs	Margin between pit-head values & f.o.b. price as % of N.S.W. margin	Freights to Singapore as % of N.S.W. freights	Apparent landed cost in Singapore as % of apparent N.S.W. landed cost
	per ton s. d.	per ton s. d.	per ton s. d.	per ton s. d.	per ton %	per ton %	per ton %	per ton %
1871	5.7	2.2	19.6	27.3	113.4	165.4	117.9	120.8
1872	5.10	3.8	23.9	33.3	174.3	97.7	103.2	115.0
1873	7.3	4.9	32.3	44.3	185.1	75.4	102.3	105.1
1874	8.0	6.0	21.9	35.9	139.5	59.7	135.6	123.8
1875	8.6	5.6	N.A.	N.A.	100.9	65.2	N.A.	N.A.
1876	8.8	5.4	16.0	30.0	83.3	67.2	126.6	103.1
1877	8.7	5.5	15.9	29.9	76.7	66.2	161.9	116.5
1878	8.7	5.5	16.0	30.0	71.8	66.2	151.6	113.3
1879	8.10	1.2	14.9	24.9	64.2	307.1	176.3	142.4
1880	8.8	0.7	17.3	26.6	67.6	614.2	127.5	118.2
1881	6.6	1.9	21.3	29.6	89.7	204.8	96.5	95.5
1882	7.7	2.5	14.6	24.6	74.7	137.9	127.6	112.2
1883	6.7	4.5	12.9	23.9	86.1	79.2	168.6	129.1
1884	6.10	4.2	11.9	22.9	79.2	90.0	180.9	133.7
1885	7.0	4.0	10.3	21.3	73.8	91.7	180.5	129.6
1886	7.1	3.11	8.6	19.6	68.2	89.4	200.0	129.9
1887	6.10	4.2	10.0	21.0	70.7	80.0	197.5	170.2
1888	7.1	3.11	14.0	25.0	71.8	80.9	178.6	133.0
1889	8.0	3.0	13.3	24.3	79.2	125 0	160.4	129.2
1890	7.0	3.2	14.6	25.6	105.3	131.6	120.7	117.6
1891	6.10	4.2	N.A.	N.A.	117.1	96.0	N.A.	N.A.
1892	6.0	4.0	6.9	16.9	120.8	91.7	185.1	139.3
1893	7.8	2.4	7.9	17.9	89.1	125.0	164.5	126.8
1894	6.9	1.3	10.0	18.0	97.5	300.0	110.0	113.9
1895	6.5	1.1	9.3	16.9	93.5	300.0	113.5	117.9
1896	6.8	0.8	9.0	16.4	87.5	437.5	177.7	151.5
1897	6.8	0.8	N.A.	N.A.	88.8	437.5	N.A.	N.A.
1898	6.10	0.6	15.3	22.7	92.7	683.3	113.3	117.3
1899	6.5	1.7	14.0	22.0	118.2	184.2	107.1	114.8
1900	6.6	4.6	16.9	27.9	166.6	125.9	110.8	121.8
1901	7.7	3.5	12.6	23.6	123.0	129.3	120.0	120.2
1902	7.11	3.1	6.9	17.9	104.2	127.0	177.7	136.2
1903	8.4	2.5	6.6	17.3	92.0	162.1	169.2	130.9
1904	7.10	2.2	N.A.	N.A.	92.6	173.1	N.A.	N.A.
1905	7.4	1.8	N.A.	N.A.	94.3	215.0	N.A.	N.A.
1906	7.9	1.3	N.A.	N.A.	93.5	286.7	N.A.	N.A.
1907	7.10	2.2	N.A.	N.A.	114.8	169.2	N.A.	N.A.
1908	8.8	2.4	N.A.	N.A.	102.9	160.7	N.A.	N.A.
1909	7.0	4.0	N.A.	N.A.	115.5	102.1	N.A.	N.A.
1910	7.5	3.7	N.A.	N.A.	110.1	97.7	N.A.	N.A.
1911	8.9	2.3	N.A.	N.A.	93.3	140.7	N.A.	N.A.
1912	8.5	2.7	N.A.	N.A.	107.9	135.5	N.A.	N.A.
1913	9.4	1.8	N.A.	N.A.	108.9	220.0	N.A.	N.A.

Source: N.S.W.—A.A. Company Out Despatches, *seriatim*, and Newcastle (N.S.W.) Chamber of Commerce, *Fifty-second Annual Report* (1937-38). For freights see R. B. Wallace, *Monthly Reports*. U.K.—The years 1882-1913 from official sources quoted by A. M. Neuman, *Economic Organisation of the British Coal Industry* (London, 1934), p. 39; the years 1871-1881 from *Seventeenth Abstract of Labour Statistics of the United Kingdom* (London, 1915), f.o.b. values computed using the average of the margin between pit-head prices and f.o.b. values for the years 1882-1913. For freights see E. A. V. Angier, *Fifty Years' Freights 1869-1919* (London, 1920).

NOTES

THE INVENTORY AND FIXED CAPITAL ACCELERATORS*

Many recent models of the trade cycle have used the acceleration principle, induced investment being made a function of change in income. Usually the models are highly aggregative, so it is total induced investment that is dependent on change in income. The model builders often mention in passing the heterogeneous nature of investment, but do not allow themselves to be detained for long by the difficulties caused by this heterogeneity. In particular it is usually pointed out that some investment is in fixed capital and some in inventories, the acceleration coefficient being the sum of the coefficients for fixed capital and inventories. The role of inventories is then largely ignored as the model builders assume that the fixed capital accelerator is much more important than the inventory accelerator. For instance, it is clear that Professor Hicks[1] regards the inventory accelerator as being only a small part of the total accelerator.[2]

This note considers the comparative importance of the fixed capital and inventory accelerators using post-war Australian and United States private investment data to see whether the emphasis usually given to the fixed capital accelerator can be justified. The approach adopted involves an elaboration of that used by Mr. Nevile in a recent note in the *Economic Record*.[3] In that note Mr. Nevile compared Professor Hicks's theory of investment with post-war investment figures in Australia and the United States, and concluded that the value of the (total) accelerator was much smaller than Professor Hicks assumed. Mr. Nevile also concluded that autonomous investment had tended to increase with time in the United States but not in Australia. In the present note some modifications have been made to Mr. Nevile's data as the treatment of inventory investment in the Australian White Papers on *National Income and Expen-*

*I am indebted to my colleagues at the University of Queensland (especially Mr. G. R. Palmer and Mr. A. J. Reitsma) and to Professor H. W. Arndt for helpful comments on an earlier draft of this note.

1. J. R. Hicks, *A Contribution to the Theory of the Trade Cycle* (Oxford, Oxford University Press, 1950).

2. This can be seen from his discussion of the operation of the accelerator in the downswing. Here the fixed capital accelerator is limited in size by technical factors—disinvestment in fixed capital can only take place by cessation of gross investment. However, "there is no technical limit to the magnitude of . . . disinvestment [in working capital and stocks], so that the accelerator remains in operation even on the downswing, so far as this part of capital stock is concerned. . . . But this disinvestment must evidently be much smaller than it would have been if the old accelerator had been at work. The investment coefficient is much reduced. It seems quite safe to say that any possibility of "explosion" will be eliminated. . . . The accelerator, in the form in which it persists into the slump, is a mere ghost of what it was in the boom." (*Ibid.*, pp. 103-4.)

3. J. W. Nevile, "Professor Hicks' Theory of Investment and Post-War Investment Figures in Australia and the United States", *Economic Record*, August 1958, pp. 249-53.

diture is unsatisfactory. The data have also been brought up to date and disaggregated to distinguish between the behaviour of investment in inventories and fixed capital.

In the regression equations below, investment in fixed capital is denoted by I^f and investment in inventories by I^i, the sum of the two, total investment, being denoted by I^t. Y denotes income, t indicates the time period[4] and R the multiple correlation coefficient. As in Mr. Nevile's note the gross figures for income and private investment have been used, and investment is made a function of change in income and time. For change in income the lag used is the one that provides the best fit. The figures under the regression coefficients are the standard errors associated with the estimates.

The Australian White Papers on *National Income and Expenditure* give estimates of gross national product, investment in inventories, and investment in fixed capital, in terms of current prices. It is not satisfactory, however, just to deflate these investment and income figures by a price index, as Mr. Nevile has done, because the White Paper estimates for inventory investment are calculated by taking the difference between the closing and opening stocks valued at end and beginning year prices respectively. Thus the White Paper figure for inventory investment in any year comprises not just the value (at average prices for the year) of the physical addition to stocks (stock accumulation) but also the change in the value of stocks as the result of price increases within the year (stock appreciation). Before inventory investment is deflated this stock appreciation component must be removed. This has been done by taking as inventory accumulation the difference between closing and opening stocks revalued at average prices for the year in the way described in a recent article in *The Economic Record*.[5] As inventory investment is a component of gross national product the White Paper figures for gross national product have been adjusted by subtracting the figures given there for inventory investment and adding in instead the figures obtained for inventory accumulation. The adjusted figures for inventory investment and gross national product and the White Paper figures for fixed capital investment were then deflated by Mr. Nevile's composite index which was extended to cover 1957-58 and 1958-59. These deflated figures are presented in Table I. Investment in farm stocks is excluded from all the investment figures.[6]

There is no need to adjust the data on inventory investment in the United States given in the *Survey of Current Business* as the figures given there represent the physical volume change in inventories valued at constant prices. This series, together with figures for

4. As annual data are used the unit period is one year.

5. J. McB. Grant and R. L. Mathews, "Depreciation and Stock Appreciation Adjustments in the National Income Accounts", *Economic Record*, April 1959, pp. 105-17.

6. Mr. Nevile points out (*op. cit.*, p. 250, n. 5) that as farm stocks are greatly influenced by factors outside Australia it is better to exclude them from the investment figures.

TABLE I

Income and Private Investment — Australia
1947-48 to 1958-59

(Millions of 1946-47 pounds)

Year	Total Investment	Investment in Fixed Capital	Investment in Inventories	Gross National Product	Change in Gross National Product
1947–48 ..				1806	
1948–49 ..	270	250	20	1839	33
1949–50 ..	311	321	−10	1952	113
1950–51 ..	415	372	43	2232	280
1951–52 ..	481	388	93	1939	−293
1952–53 ..	227	320	−93	2045	106
1953–54 ..	397	356	41	2205	160
1954–55 ..	476	413	63	2319	114
1955–56 ..	456	427	29	2399	80
1956–57 ..	441	414	27	2509	110
1957–58 ..	497	451	46	2582	73
1958–59 ..	457	460	−3	2671	89

Sources: The undeflated figures for all years except 1947-48 were taken from the White Paper on *National Income and Expenditure 1958-59*. The 1947-48 figures were taken from the 1955-56 White Paper. The undeflated figures were deflated by Mr. Nevile's composite index (base 1946-47) which was extended to cover 1957-58 and 1958-59. This index (which was constructed from indexes published in the *Monthly Review of Business Statistics*) weights the "C" Series Retail Price Index and the Wholesale Price (Basic Materials and Foodstuffs) Index in the ratio 2 : 1.

TABLE II

Income and Private Investment — U.S.A.
1947 to 1958

(Billions of 1954 dollars)

Year	Total Investment	Investment in Fixed Capital	Investment in Inventories	Gross National Product	Change in Gross National Product
1947 ..				282.3	
1948 ..	49.8	45.5	4.4	293.1	10.8
1949 ..	38.5	42.1	−3.6	292.7	−0.4
1950 ..	55.9	48.7	7.2	318.1	25.4
1951 ..	57.7	48.0	9.7	341.8	23.7
1952 ..	50.4	47.8	2.6	353.5	11.7
1953 ..	50.6	50.1	0.5	369.0	15.5
1954 ..	48.9	50.5	−1.6	363.1	−5.9
1955 ..	62.5	56.4	6.1	392.7	29.6
1956 ..	63.1	57.6	5.6	402.2	9.5
1957 ..	57.8	56.4	1.4	407.0	4.8
1958 ..	47.4	50.9	−3.5	395.4	−11.6

Sources: U.S. Department of Commerce, *Survey of Current Business*, July 1958 and February 1959.

gross national product and investment in fixed capital at constant prices, is given in Table II.

For Australia the following regression equations were obtained:

$$I^a_t = 319{\cdot}6 + \underset{(0{\cdot}05)}{0{\cdot}48}\,(Y_{t-1} - Y_{t-2}) + \underset{(2{\cdot}3)}{13{\cdot}1t};\ R = 0{\cdot}98$$

$$I^f_t = 320{\cdot}3 + \underset{(0{\cdot}04)}{0{\cdot}15}\,(Y_{t-1} - Y_{t-2}) + \underset{(1{\cdot}9)}{13{\cdot}5t};\ R = 0{\cdot}95$$

$$I^i_t = -0{\cdot}7 + \underset{(0{\cdot}03)}{0{\cdot}34}\,(Y_{t-1} - Y_{t-2}) - \underset{(1{\cdot}6)}{0{\cdot}4t};\ R = 0{\cdot}97$$

The United States data yielded the following regression equations:

$$I^a_t = 40{\cdot}75 + \underset{(0{\cdot}10)}{0{\cdot}47}\,(Y_t - Y_{t-1}) + \underset{(0{\cdot}38)}{1{\cdot}48t};\ R = 0{\cdot}89$$

$$I^f_t = 41{\cdot}53 + \underset{(0{\cdot}05)}{0{\cdot}17}\,(Y_t - Y_{t-1}) + \underset{(0{\cdot}21)}{1{\cdot}41t};\ R = 0{\cdot}93$$

$$I^i_t = -0{\cdot}86 + \underset{(0{\cdot}06)}{0{\cdot}30}\,(Y_t - Y_{t-1}) + \underset{(0{\cdot}24)}{0{\cdot}07t};\ R = 0{\cdot}87$$

The removal of inventory appreciation from the Australian investment and income figures means that two of Mr. Nevile's results have to be revised. First, the estimated value of the accelerator in Australia is reduced from 0·61 to 0·48. Secondly, Mr. Nevile's conclusion that autonomous investment has not tended to increase with time is seen to be incorrect.[7] The first of the above equations indicates that there has been a significant upward trend in autonomous investment.[8]

There is an interesting similarity between the results obtained for the two countries. In both Australia and the U.S.A. most of fixed capital investment is autonomous rather than induced, and in both countries this autonomous component has a significant upward trend. As might be expected there is no significant autonomous component of inventory investment in either country. The values obtained for the accelerators in the two countries are remarkably consistent. However, for Australia the acceleration principle operates only after a lag of a year, there being no such lag in the investment functions obtained for the U.S.A.

The regressions obtained suggest that the fixed capital accelerator (0·15 for Australia and 0·17 for the U.S.A.) is smaller[9] than the inventory accelerator (0·34 for Australia and 0·30 for the U.S.A.). It would thus seem that the emphasis on the fixed capital accelerator in models such as Hicks's may be misplaced and that the behaviour

7. The illusion that autonomous investment in Australia did not increase with time was caused by the greater importance of stock appreciation in the earlier years. This artificially raised investment in those years.

8. That this is so can be seen by comparing the regression coefficient of time with its standard error.

9. It appears that the fixed capital accelerator is about half the size of the inventory accelerator.

of investment in the post-war period may more fruitfully be studied within the framework of models such as Metzler's[10] and Nurkse's[11] that use the inventory accelerator.[12] Certainly trade cycle models involving the interaction of the multiplier and the accelerator should emphasize the inventory accelerator more than they usually do and should not regard it as being unimportant compared with the fixed capital accelerator.

D. J. SMYTH

University of Queensland.

INFLATION AND COMPANY FINANCE : A REPLY

In a comment[1] on our book, *Inflation and Company Finance*,[2] Warren Hogan criticizes us for not distinguishing between the problem of "maintaining the productive capacity of an *enterprise*" and that of "measuring the replacement cost of an *asset*", and says that the book "is devoted to a discussion of the methods of estimating the replacement cost of an asset and the inefficiency arising through the use of historical cost depreciation during periods of fluctuating prices". Elsewhere he claims that "the main purpose of the book is to put forward proposals for replacement cost depreciation".

Even a cursory examination of our book should reveal that it is not concerned with depreciation in particular, but is devoted to a study of the general problem of accounting in time of inflation, with special reference to the measurement of business surplus and the maintenance of financial stability. In so far as the depreciation problem is discussed it is related to these purposes, and our proposals do not involve what Dr. Hogan calls replacement-cost depreciation. In the section of the book headed "accounting for depreciation" we distinguished between the traditional accounting concept and another concept which we described as *current depreciation*, defined as "the current cost of using fixed assets in producing revenue during the period". We further distinguished between current depreciation and replacement-cost depreciation, and discussed the differences in terms which should have left Dr. Hogan in no doubt as to our reasons for rejecting the latter concept. We specifically denied that the proposals

10. L. A. Metzler, "The Nature and Stability of Inventory Cycles", *Review of Economic Statistics*, August 1941, pp. 113-29, and "Factors Governing the Length of Inventory Cycles", *Review of Economic Statistics*, February 1947, pp. 1-15.

11. R. Nurkse, "The Cyclical Pattern of Inventory Investment", *Quarterly Journal of Economics*, August 1952, pp. 385-408, and "Period Analysis and Inventory Cycles", *Oxford Economic Papers*, September 1954, pp. 203-25.

12. Metzler's model uses an average inventory/output ratio rather than a "marginal" accelerator used by Nurkse and in this note. The two approaches are, however, essentially the same, and the use of a "marginal" accelerator does not distinguish Nurkse's model from Metzler's. On this see E. S. Mills, "Professor Nurkse on Inventory Cycles", *Oxford Economic Papers*, June 1955, pp. 226-28.

1. *Economic Record*, August 1959, p. 272.

2. Law Book Company of Australasia Pty. Ltd., Sydney, 1958.

we made constitute a system of replacement-cost accounting. Indeed, we said, they involve "the continuation of historical-cost accounting for purposes of profit measurement, with supplementary adjustments to provide a record of the current cost of depreciation and stocks sold or used", and we demonstrated that "there is no guarantee that these procedures will automatically or fully provide for replacement".[3] We showed that replacement-cost accounting would involve making "the depreciation charge in any period equal to the sum of the following:

(*a*) depreciation based on the current replacement value of the asset; plus

(*b*) the amount by which previous depreciation charges, based on the lower replacement values prevailing in previous periods, have been insufficient to provide for replacement on the basis of current values."

Because the adjustment for (*b*) would distort the measurement of business surplus in current terms (which we described as *current income*) this concept of replacement-cost was inappropriate; it involved a departure from the procedure whereby all costs and expenses are expressed in current values and are thereby free from the distortions produced by changing money values. This criterion of expressing all items in the same money values is familiar to economists since, among other things, it is basic to national income accounting.

Having distinguished between current depreciation and replacement-cost depreciation, the next consideration is whether Dr. Hogan's arguments against the latter concept are relevant to the former. His general line of argument is that in certain cases historical-cost depreciation provides adequate finance for replacement purposes. The first branch of his argument is based on the Domar effect.[4] He points out that even though the depreciation allowance for the individual asset may be insufficient to meet costs of replacement at the end of life of that asset, for an expanding company total depreciation allowances may be more than sufficient to meet replacement charges. In considering this argument it is necessary to distinguish between the financial problem of providing for the replacement of fixed assets and the accounting problem of measuring the consumption of fixed assets. Dr. Hogan altogether fails to make this distinction and is confused about the nature and significance of accounting and economic concepts of depreciation. The fact that in certain circumstances depreciation allowances as calculated for accounting purposes may exceed replacement requirements is not relevant to the problem of measuring periodic surplus. The magnitude of the financial problem is, of course, influenced by the Domar effect, as we pointed out in a later section of the book.[5] However, the significance of the Domar effect depends

3. *Inflation and Company Finance*, p. 21.

4. See E. D. Domar, "Depreciation, Replacement and Growth", *Economic Journal*, March 1953.

5. *Inflation and Company Finance*, p. 97.

not only on the rate of expansion but also on the rate of price increase and the time path of replacement of fixed assets. As Dr. Hogan himself has shown in another article, "far from annual depreciation charges exceeding annual replacement requirements, there is the clear possibility that, with even modest price rises, the relationship between these two items will be reversed".[6]

Dr. Hogan's second sally against replacement-cost depreciation is expressed in his own words, as follows: "Annual depreciation allowances are accumulated in advance of replacement needs and such 'excess' sums are retained to finance the operations of the company. But enterprise does not seem to allow for the profitability of these depreciation reserves when assessing annual appropriations for depreciation. Yet there seem to be good grounds for allocating each year an additional sum, over and above ordinary depreciation charges, representing the interest earned on depreciation reserves."[7]

This proposal seems to combine some of the features of the annuity and sinking fund methods of providing for depreciation which most accountants have discarded for the very reason that they distort the profit measurement process. Once again Dr. Hogan insufficiently allows for the distinction which needs to be made between the financial problem of replacement and the accounting problem of cost allocation, but even if his proposal is considered from the viewpoint of financial policy it is illogical. In times of price stability it will result in accumulated depreciation provisions exceeding the cost of replacing the asset. In times of inflation the additional depreciation allowances are not necessarily sufficient to provide for the increase in the cost of replacement, because their size depends on a rate of interest or profit and not on the rate of price increase.

On the mechanics of estimating current replacement cost by means of an index of prices of plant and machinery, Dr. Hogan is concerned that the results of technical progress may not be wholly accounted for in a straightforward price index. This possibility was not overlooked by us, since we specifically pointed out that "it is doubtful whether the index (of the current replacement cost of plant and machinery) makes adequate allowance for technical innovations in the sense that improvements in the quality of capital equipment may not result in a fall in the index as they should *ceteris paribus*".[8]

A further point raised by Dr. Hogan is that, on the evidence of the accounts of twenty South Australian companies which we examined, it appeared to him "that they were not impelled by any sense of urgency to record claims for higher depreciation allowances". In dealing with this issue it is first necessary to correct Dr. Hogan's statistics. Between 1945-6 and 1951-2 initial depreciation allowances for the twenty South Australian companies amounted to £905,000

6. "The Equality of Replacement and Depreciation", *Economic Record,* August 1959, p. 208.
7. *Op. cit.*, p. 273.
8. *Inflation and Company Finance,* p. 84.

and not £904 millions as stated by Dr. Hogan. The sum of initial depreciation allowances which they recorded in this account was £365,000, not £365 millions, and the difference is thus £540,000 and not Dr. Hogan's "staggering" £540 millions. The cause of this difference of £540,000 is explained in the book. Of the fourteen companies which claimed initial depreciation allowances for tax purposes nine companies recorded the initial allowances in their accounts and published reports. The remaining five companies were not necessarily unaware of the financial problem. As we pointed out, these companies took other steps to deal with it, *e.g.* by making allocations to disclosed reserves. Moreover, we indicated that the figures for the creation of secret reserves must be regarded for various reasons as incomplete. When all this is said, however, Dr. Hogan seems to have missed the major point of our analysis concerning the twenty companies, which was to show that "the combined techniques employed by the twenty South Australian companies, in the years 1947-48 to 1951-52, fell short of what was theoretically necessary to counteract the effects of inflation on their financial structures".[9]

Dr. Hogan's main concern seems to be to show that conventional methods of accounting for depreciation do not necessarily cause financial instability in time of inflation. His preoccupation with depreciation has caused him to overlook one of the major conclusions of the book, to the effect that in the aggregate of companies "stock appreciation is normally a far more potent source of financial instability"[10] than depreciation.

II

In his review of *Inflation and Company Finance* in the same issue of the *Economic Record*[11] Dr. Cameron disagrees with us both in regard to our interpretation of the statistics and on the question whether companies ought to adopt the accounting and pricing policies which we recommend.

Dr. Cameron claims that our statistical evidence does not support the theoretical arguments we put forward in order to show how conventional accounting procedures result in financial instability in time of inflation. Figures are quoted to the effect that, out of capital formation totalling £1,510 million over the years 1945-46 to 1952-53, £1,114 million or 74% was financed from internal sources. Dr. Cameron's figures are misleading for several reasons. First, the figures for capital formation include replacement expenditures, and in particular stock appreciation, which ought to be financed from internal sources as a matter of course. Secondly, increases in tax and dividend provisions, which on any criterion must be regarded as short-term liabilities, are incorrectly included in Dr. Cameron's figures as an *internal* source of finance. Thirdly, by aggregating the figures for the eight

9. *Inflation and Company Finance*, p. 127.
10. *Ibid.*, p. 138. See also the extended discussion on this topic on pp. 96-100.
11. *Economic Record*, August 1959, p. 266.

years Dr. Cameron has included the recession year 1952-53. We stated explicitly that this year, in which there was a dramatic reversal in the trend of prices, was included merely for purposes of comparison. Under these circumstances the aggregate figures can hardly be expected to show adequately the financial stresses produced by rising prices. The final reason for questioning the usefulness of aggregate statistics such as Dr. Cameron has produced is that they incorporate money values of different purchasing power, a problem which was central to the whole theme of our book.

On the question of principle it is difficult to see how Dr. Cameron can deny that there is a financial problem during inflation. Faced with rising costs of replacement, a company must augment its funds from external or internal sources if it is to maintain its scale of operations. Dr. Cameron's suggestion that internal sources of finance are only inadequate if prices are based on historical costs and profits are fully distributed is too restrictive. We showed in the book that internal sources are only sufficient to finance the increase in the current replacement cost of fixed assets and stocks when distribution policy is based on current income. Moreover, his suggestion that companies in fact ignore historical costs for pricing purposes flies in the face of the empirical and statistical evidence that is presented in the book. Even where firms were able to raise margins to offset the rise in current costs this was not done generally or scientifically. To suggest, as Dr. Cameron does, that existing firms raise their prices to match the costs of actual or potential new entrants is illogical. As we indicated on p. 154, it is more likely that new entrants will be prevented from establishing themselves by the historical-cost pricing policies of existing firms. This is certainly what happens under price control.

We have never denied that some firms raised margins or adopted replacement-cost pricing policies, just as we have never denied that most firms have ploughed back profits into disclosed or hidden reserves. In fact, we went to a good deal of trouble to show the extent to which companies acted along these lines. We demonstrated, however, that in the aggregate such action was inadequate, and we prescribed accounting procedures and pricing policies which must be followed in order to avoid financial deterioration and maintain earning power. There is a recurring suggestion throughout Dr. Cameron's review to the effect that accounting procedures and management policies are not and ought not to be closely related. This really brings us to the heart of the difference between Dr. Cameron and ourselves. We hold the view that one of the major functions of accounting is to provide information that can be used for purposes of policy-making; if firms do not use accounting data in making policy decisions, what do they use? We maintain, moreover, that the problem of measuring periodic surplus cannot be divorced from the problem of policy objectives; that the measurement of surplus only has meaning if it is related to the purposes for which the measurement is being carried out.

Dr. Cameron is guilty of an inconsistency when he argues that

companies ought not to raise prices (and hence profits) during inflation, since he has previously suggested that they only avoided a financial problem by so doing. In any case, in considering the question of principle he has ignored two of the more important objectives of our proposals, economic stability and efficiency of resource allocation. As an alternative to our system it would undoubtedly be possible to have a system of accounting and pricing based wholly on historical money values, with full distribution of profits so that companies would be obliged to keep on raising new capital to cover the rising replacement cost of assets. However, such a system would involve a reduction in aggregate saving compared with our system, and because it would give a misleading impression of profitability in the individual firm it would tend to cause a misallocation of resources. Dr. Cameron has done nothing to disprove our thesis that conventional accounting and pricing policies tend to cause financial weakness, deterioration in earning power and inefficiency in the use of resources, and we hold to the view that our proposals constitute a reasonably sure way of avoiding such problems.

RUSSELL MATHEWS

University of Adelaide.

JOHN McB. GRANT

University of Tasmania.

PRODUCTION FUNCTIONS : A FURTHER REMARK

I heartily agree with the last paragraph of Mr. Soper's Reply.[1] In view of the inadequacy of many empirical investigations on production functions, it is not superfluous to stress what should be fairly obvious from general principles, namely, that in estimating an average production function from a survey the firms included must be reasonably homogeneous with respect to their production function (unless adequate adjustments can be made). Moreover, selecting the firms merely on the basis of some easily observed characteristics (type of enterprise, soil type, etc.) is not a substitute for testing for homogeneity with regard to the production function.

Further corroboration of the necessity for homogeneity comes from some calculations of the possible extent of bias in the heterogeneous case in an interesting paper by Hoch,[2] which became available in Australia after my paper had been set up in type. But I do not agree with Hoch's assertion that, if firms determine inputs with regard to anticipated rather than currently realized output-input relations, the bias is necessarily nil; for anticipated relations, too, may differ among firms and deviate from an assumed form of relation. Hoch's method of estimating the bias is valid for large samples, but

1. "Production Functions : A Reply to Dr. Konijn", *Economic Record*, December 1959, pp. 434-5.

2. "Simultaneous Equation Bias in the Context of the Cobb-Douglas Production Function", *Econometrica*, October 1958, pp. 566-78.

its (large sample) variance and its small sample properties have not been derived.

The difficulty brought up by Mr. Soper in connection with wide annual fluctuations in yield is generally overcome in empirical studies by the use of averages of the observations over several years.

H. S. KONIJN

The University of Sydney.

THE MARGINAL EFFICIENCY OF CAPITAL AND THE EFFECT OF THE DISCOUNTING PERIOD

In a contribution to the present discussion of the marginal efficiency of capital in *The Economic Journal*[1] and *The Economic Record*[2] J. F. Wright[3] pointed out that the length of the accounting period[4] directly influences the number of negative returns. The purpose of this note is to demonstrate that the length of the accounting period can also affect the length of the life of the investment.

We will demonstrate our point by arithmetic examples. For simplicity, we assume that the expected scrap value of the asset in period n is zero.[5]

(*a*) The technological life of an asset is four years. An investor calculates on an annual basis and his expected returns are:

$$Q_1 = Q_2 = Q_3 = 2, \qquad Q_4 = -2.$$

If there were no institutional restraints on the investor's freedom to determine the investment life, this life would be three years. However, suppose that a different investor in the same asset uses a semi-annual period and expects the following returns:

$$Q_1 = \ldots. = Q_4 = 1,\ Q_5 = 3,\ Q_6 = Q_7 = Q_8 = -1.$$

The life would then be five semi-annual periods, i.e. $2\frac{1}{2}$ years.

(*b*) But suppose the semi-annual returns are expected to be:

$$Q_1 = \ldots. = Q_7 = 1, \quad Q_8 = -3.$$

The life would then be $3\frac{1}{2}$ years.

(*c*) Examples giving more striking results can easily be constructed. Suppose the cost of the asset is one unit and the investor expects the following annual returns:

$$Q_1 = Q_2 = 1, \quad Q_3 = 14, \quad Q_4 = -1.$$

1. J. D. Pitchford and A. J. Hagger, "A Note on the Marginal Efficiency of Capital" (September 1958); C. S. Soper, "The Marginal Efficiency of Capital: A Further Note" (March 1959); T. H. Silcock, "Complementarity and Future Time: A Note on the Marginal Efficiency of Capital" (December 1959); J. F. Wright, "The Marginal Efficiency of Capital" (December 1959).
2. P. H. Karmel, "The Marginal Efficiency of Capital" (December 1959).
3. *Loc. cit.*, p. 814.
4. All theories of the marginal efficiency of capital should, for preference, integrate the discounted net returns as a function of time, but for obvious reasons this is impracticable and time is arbitrarily divided into accounting periods.
5. Karmel's R_n term. *Loc. cit.*, p. 429.

The life would then be three years. If, however, the semi-annual returns are:

$$Q_1 = 4,\ Q_2 = -3,\ Q_3 = -8,\ Q_4 = 9,\ Q_5 = -2,\ Q_6 = 16,$$
$$Q_7 = -\tfrac{1}{2},\ Q_8 = -\tfrac{1}{2},$$

then the discounting equation becomes

$$16p^6 - 2p^5 - 9p^4 - 8p^3 - 3p^2 - 4p - 1 = 0$$

where $p = \dfrac{1}{1+r}$.

The above equation is satisfied by $p = \frac{1}{2}$. The polynomial $4p - 1$ has as its sole root $p = 1/4$ while the polynomials

$$\sum_{1}^{k} Q_i p^i - 1,\ 1 < k \leqq 8,$$

have no roots between 0 and 1/4. It follows that if the investor has perfect freedom to withdraw from the plan when he chooses and if he is aiming at maximization of his r, then he will decide on an investment life of only six months.

Z. M. KUBINSKI
C. A. WILKINS

The University of New South Wales.

TAXATION AND BUSINESS SURPLUS*

1. In this note it is presumed that the aim of investment decisions is the achievement of the most desired spread of consumption over time, and that the maximization of periodic profits is only a means of achieving this aim. It is further presumed that the allocation of resources is to be determined by the free operation of the price mechanism unless there are specific reasons for interfering with this allocation. In the light of these presumptions it is proposed to examine the present tax base of accounting profit and a proposed tax base of "economic income". "Economic income" is defined as revenues less current opportunity costs. This can be contrasted with accounting profit which is revenues less historical costs. In practice economic income can be calculated by making several adjustments to accounting profit. It would be necessary to calculate depreciation allowances by the annuity method described below, and to adjust for those items recorded in the prices of past accounting periods. The latter consists of revaluing depreciation allowances (as defined) in terms of the current replacement costs of fixed assets, and of revaluing the "Costs of Goods Sold" in current terms to remove the stock appreciation element from accounting profits.

2. The assessment of taxation requires that businessmen calculate returns from operations for discrete periods of time. This process is known as the matching procedure, and gives rise to the distinction

*The authors are indebted to the members of the Departments of Economics and Commerce of the University of Adelaide for the comments on this note.

between revenue and capital items, and to the problem of averaging capital payments for factors of production. With the existing taxation legislation the original outlays on such capital items are allowed as deductions either by a simple averaging process (straight-line depreciation), or by allowing a constant proportion of the original outlay less amounts previously written off (reducing-balance depreciation). In both cases the total of the amounts deducted cannot be greater than the original money outlay. To maximize profits businessmen make decisions concerning alternative investment projects and the relative proportions in which factors of production are to be combined. This requires comparisons of revenues and costs[1] which, in the economic sense, depend upon both the amount and the timing of the relevant receipts and outlays. For example, the average annual cost of a capital asset involving an outlay of £1,000 with an effective life of 10 years, is not £100 per annum as with straight-line depreciation, but rather one of a series of annuities, the present value of which is equal to £1,000. With a marginal cost of capital of 5% the annual cost would be £129·5.[2] This is the cost of capital which a rational businessman would consider when comparing alternative projects and choosing the most desirable combinations of factors of production. *In this case the total of the amounts deducted is greater than the original money outlay and, therefore, the amounts at present allowed for taxation purposes.* This difference seriously distorts the allocation of resources.

3. It is clear that taxation reduces profitability relative to pre-tax situations. If taxation is to be based upon comparisons of relative pre-tax costs, and as businessmen make decisions on the basis of post-tax data, it is necessary that the relative costs of the factors of production should not be distorted by the imposition of taxation. The existing taxation legislation, because it under-estimates the cost of capital, gives rise to the adoption of more labour-intensive techniques than the desired allocation of resources would require. The annuity method of assessing depreciation allowances for taxation purposes would obviate this distortion as the relative costs of the various factors of production would then be unaffected by taxation payments.

4. In the absence of taxation the total cost of an investment project to a businessman can be written as:

$$C + L\,a_{\overline{n}|i} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (1)$$

where C = the money outlay on the capital asset at time O.

L = the annual payments for labour and raw materials.

$$a_{\overline{n}|i} = \frac{1-(1+i)^{-n}}{i}$$

where i = the marginal cost of capital.

1. By "costs" is meant the current opportunity costs of the factors of production concerned.

2. It is clear that interest *as such* should not be allowed as a deduction for taxation purposes.

n = the effective life of the capital asset in years.

With the existing taxation legislation the cost can be written as:

$$C - \frac{tC}{n} a_{\overline{n}|i} + L\, a_{\overline{n}|i} - tL\, a_{\overline{n}|i}$$

where t = the marginal tax rate.

That is, assuming a positive taxable income in each year, the present values of the costs of capital, labour and raw materials are reduced by the present values of taxation deductions subsequently allowed, multiplied by the marginal rate of tax. This expression reduces to:

$$C\left(1 - \frac{t}{n} a_{\overline{n}|i}\right) + L\, a_{\overline{n}|i}(1-t) \quad .. \quad .. \quad .. \quad (2)$$

The *relative* costs of capital, labour and raw materials in (2) differ from those in (1), except in the trivial cases of n = 1 or i = 0. However, with the proposed annuity method, the cost can be written as:

$$C - \frac{tC}{a_{\overline{n}|i}} . a_{\overline{n}|i} + L\, a_{\overline{n}|i} - tL\, a_{\overline{n}|i}$$

This reduces to $(1-t)(C + L\, a_{\overline{n}|i})$ .. .. (3)

(In this case the depreciation allowances x are derived from the expression $C = x\, a_{\overline{n}|i}$, and not $x = \frac{C}{n}$ as above.)[3] The relative costs in (3) are identical with those in (1) as they are both multiplied by the common factor (1 — t), that is, the choice between capital, labour and raw materials is unaffected by the imposition of taxation.

5. It will be apparent that the marginal cost of capital (i) will differ as between firms. The relevant marginal cost of capital will vary according to the circumstances in which the firm is placed and indeed may be the borrowing or lending rate of interest, or the rate of return on the project which is marginal to the firm.[4] If taxation is not to distort the allocation of resources, the rate of interest used in the calculation of depreciation allowances for tax purposes must be equal to the marginal cost of capital to the firm concerned. Clearly this is impracticable, and it would therefore be necessary to use a uniform rate of interest as, for example, the current rate of interest on bank overdrafts. This is likely to be the minimum cost of capital to the firm. To the extent that it is less than the actual marginal cost of capital a distortion would remain, but it would be less than the distortion existing with the present taxation legislation which makes no allowance at all for the time factor, that is, it implies a marginal cost of capital of zero.

3. It has been assumed that conventional depreciation allowances are assessed on the straight-line basis.

4. There is currently a controversy as to which rate of return is relevant in different situations. See, for example, J. Hirshleifer, "On the Theory of Optimal Investment Decision", *The Journal of Political Economy*, Vol. LXVI, No. 4 (August 1958), pp. 329-52; Martin J. Bailey, "Formal Criteria for Investment Decisions", *The Journal of Political Economy*, Vol. LXVII, No. 5 (October 1959), pp. 476-88.

6. With the existing tax base of accounting profit, depreciation allowances suffer from a further limitation in that they reflect historical costs rather than the current opportunity costs relevant to the measurement of profitability for current decision-making purposes. This is also true of the "Costs of Goods Sold". To overcome these limitations, depreciation allowances and "Costs of Goods Sold' must be based upon current replacement costs. This requires the two additional adjustments to accounting profit referred to in paragraph 1 above. The calculation of these adjustments arising from changes in the costs of asset replacement have been set out by Professors Mathews and Grant.[5]

7. It has been argued that economic income is the relevant concept of periodic profit for the purpose of assessing taxation. To the extent that businessmen aim to maximize economic income the above analysis is fully applicable. If, however, businessmen are not rational, and aim at the maximization of a concept of profit which is inconsistent with the maximization of economic income, for example, accounting profit, the suggested change in the tax base can still be justified on two grounds. First, if a distortion exists because of irrational behaviour on the part of businessmen, then it is worsened by the existing taxation legislation. Secondly, in so far as businessmen are influenced by the concept of surplus used by the taxation authorities, the adoption of economic income as the tax base could lead directly to a more efficient allocation of resources.

J. W. BENNETT
G. C. HARCOURT

University of Adelaide.

5. See Russell Mathews and John McB. Grant, *Inflation and Company Finance* (Sydney: Law Book Co. of Australasia, 1958), Chapter II.

NEWS AND NOTES

We record with very great regret the death of Erik Lindahl of Uppsala, Sweden.

Lindahl came to Australia in 1952 to spend six months with the Commonwealth Bank of Australia as a visiting economist. He was then on leave from his chair in the University of Uppsala. He was, of course, well known in Continental Europe; he was less well known to the English-speaking world, but the realization of his contribution to economics was spreading. The protagonist of "Swedish gap analysis", he made an indelible mark on the history of economic thought.

Although his most original contributions were made in the thirties, Lindahl remained active until a year or two before his death. He was sixty years of age when he came to Australia, and an unusually vigorous man with a very keen mind. But those who knew him will remember just as much his unfailing charm and great humanity.

Corrigendum. We regret a printing error in Sir Donald MacDougall's article on "The Benefits and Costs of Private Investment from Abroad : A Theoretical Approach", published in *The Economic Record,* Vol. XXXVI, No. 73 (March, 1960). On page 19, the second complete paragraph should begin: "If the criterion for immigration were that it should vary with foreign investment . . ."

BRANCH SECRETARIES

New South Wales: R. R. Clark, c/o The Mutual Life and Citizens' Assurance Co. Ltd., Box 1598, G.P.O.

Victoria: Dr. W. M. Corden, Department of Commerce, University of Melbourne, Parkville, N.2, Victoria.

Queensland: C. P. Harris, Department of External Studies, University of Queensland, St. Lucia, Brisbane, S.W.6, Queensland.

South Australia: K. Hancock, Department of Economics, The University, Box 498 D, G.P.O., Adelaide, South Australia.

Western Australia: Kenneth M. McKenna, c/o Treasury Department, Barrack Street, Perth, Western Australia.

Tasmania: D. E. Kirby, Box 665 E, G.P.O., Hobart, Tasmania.

Canberra: J. G. Head, Department of Economics, Canberra University College, Canberra City, A.C.T.

Wellington: I. F. E. Wilson, c/o Bowden, Bass & Cox, Public Accountants, 328-330 Lambton Quay, Wellington, New Zealand.

Auckland: A. D. Brownlie, Economics Department, University of Auckland, P.O. Box 2553, Auckland, New Zealand.

Christchurch: N. L. McBeth, c/o "Press", The Square, Christchurch, New Zealand.

Dunedin: A. Thornicroft, P.O. Box 546, Dunedin, New Zealand.

REVIEWS

Studies in Company Finance. Edited by B. TEW and R. F. HENDERSON. (National Institute of Economic & Social Research, Cambridge University Press, Cambridge 1959.) Pp. xix + 301. 35/- stg.

This long-awaited study of British company finance is at once rewarding and disheartening—rewarding because of the importance of many of the questions discussed and of the skill with which large masses of intractable data have been handled, disheartening because so few significant generalizations emerge which are not hopelessly enclustered with necessary qualifications.

The bulk of the discussion centres around an analysis of the accounts of some 2,500 quoted companies for the period 1949 to 1953. These accounts have been arranged in a standardized form from which have been prepared aggregate balance sheets, income, and sources and uses of funds statements for this group as a whole, for twenty-one industry sub-groups, for eight size classifications, and for four rate of growth (in terms of net assets) classifications. The behaviour of companies within these groups has been further analysed by reference to a number of indicators concerned with such features as liquidity, trade credit behaviour, savings and investment ratios.

The book falls into two parts. The first one deals with questions affecting companies generally such as dividend policy, self financing, capital issues, the use of bank overdraft and trade credit, and the relationships between size, growth and concentration. The second considers in more detail the experience of a selection of individual industries.

Some of the more important general conclusions which emerge from the earlier chapters are: that considerable reliance was placed on the new issue market especially by the fast growing and large companies; that relatively little use was made of bank credit; that trade credit, on the other hand, played a significant part in the overall financial position, and that, in the short period surveyed, there was an increase in the degree of company concentration. In terms of methods of analysis it is found that, usually, differences in company behaviour are more likely to be explicable in terms of differences in rates of growth and size rather than differences as between industries as conventionally defined.

In the main, analysis is in terms of five year changes rather than annual movements, and is concentrated on the different financial behaviour of companies rather than on relating changes in this behaviour to other types of movement within the economy. Given the bewildering variety of behaviour that emerges and which is one of the major conclusions of the work, one cannot but share the authors' doubts about the meaningfulness of comparisons of the latter type. Nevertheless, one still cannot help feeling, when looking for instance

at the aggregate sources and uses table, that a great deal of these inter-company differences cancel themselves out and that the net annual movements in the aggregate are capable of being related to general movements in the economy. It is a pity that such an analysis was not attempted if only as a revelation of its shortcomings.

In what is for most English (and Australian) economists a new field of evidence, the authors have cleared the way in terms of what are the appropriate techniques of analysis. As they freely admit, however, much still remains to be done.

A. R. HALL

Australian National University.

Six Lectures on Economic Growth. By SIMON KUZNETS. (Free Press of Glencoe, Illinois, 1959.) Pp. 122. $3.50.

These six essays should be prescribed reading for economic theorists thinking or beginning to think about problems of growth. Though far from unsophisticated the ground covered is mainly descriptive. Not a single difference or mixed difference differential equation appears in the book despite its title.

On the other hand, Professor Kuznets makes it clear in his final lecture that the guiding assumption of his statistical survey is, "that economic growth has many characteristics . . . by which the process can be identified, and which warrant the expectation of finding common aspects interrelated in sufficiently coherent and invariant fashion to amount to more than a mere statistical generalization or mechanical coincidence". In other words it is an article of the author's faith that the main features of the observed phenomena can be summarized in an idealized model. The book is evidently intended to provide raw material for the model builder as well as to offer a more general introduction to problems of growth.

The six lectures are constructed around eleven tables which compare the experiences of a wide range of different countries grouped in various ways according to size and/or per capita product. The first three tables compare rates of growth of per capita product and illustrate the effect of extrapolating these both forward and back. It becomes clear that high rates of growth are a comparatively modern phenomenon. Table (iv) demonstrates how rates of growth vary enormously intertemporally within countries as well as between them. This gives rise to speculation regarding the nature of the necessary conditions for expansion.

In lecture III Professor Kuznets points to peculiarities in the pattern of the shares in the labour force of three productive sectors, agriculture, manufactures and services, demonstrating the differences in these over time and between countries. Various hypotheses are put forward to account for such differences, some being familiar, others less so. Tables (v)-(vii) illustrate the argument.

This leads on to a discussion of the process of capital formation.

Tables (viii) and (ix) present relevant statistics. The point is made that differences in capital formation ratios are not in themselves a sufficient reason for differing rates of growth of per capita product even when due allowance is made for population growth.

Finally Professor Kuznets turns to the vexed question of growth and international trade. There is a distinct and expected inverse correlation between size and the ratio of trade to national output (Table x) but there is no clear evidence of any decline in the ratio of trade to national output with growth (Table xi). The book is concluded with some penetrating comment upon the task which the theorist is set by the author's survey of the facts.

It would be easy to criticize both the validity of the statistics presented by Professor Kuznets and some of his more speculative hypotheses. It would not, however, be so easy to replace either with anything better.

I. F. PEARCE

Australian National University.

Capital, Interest and Profits. By B. S. KEIRSTEAD. (Basil Blackwell, Oxford, 1959.) Pp. ix + 180. 22/6 stg.

The current resurgence of interest in explicit theories of growth is in part responsible for an increasing awareness of the deficiencies of the neo-classical approach to the economics of production. It is coming to be understood all over again that there is something more to the concept of capital than just another input, and something more to the concept of profit that just another factor reward. Professor Keirstead's book reinforces the impression that a new round of argument on the subject of the theory of the firm is well overdue.

This does not mean that the work under review either is, or is intended to be, a new synthesis of production theory. On the contrary it is clearly put together from a number of essays and lectures on a wide range of topics written for other and independent purposes. But the overall theme is change and growth whether the discussion is at the micro or macro level.

We are reminded first that money is not capital and that, in any kind of society, money cannot be turned into capital, nor can capital be created, without real saving. Moreover, real saving must proceed concurrently with capital accumulation. The role of the profit seeking entrepreneur in the saving/accumulating process is crucial. This leads to a reconsideration of the concept of profit.

The usual distinction is drawn between risk and uncertainty, uncertainty being treated in terms of the now familiar "potential surprise". It is a pity that no consideration is given to the all too common situation where no one would be at all surprised if the unexpected happened. But Professor Keirstead is not alone in this particular omission.

Net profit is defined as the reward for risk and uncertainty bearing. Hence the equilibrium rate of gross profit will be very much in

excess of the equilibrium rate of interest. This leads to some interesting if not entirely convincing conclusions regarding the equilibrium of the firm. Purists will, of course, wonder whether anything can ever be achieved by discussing the price (reward) of an input, like uncertainty, the unit of which is undefined. May it not be better to treat risk simply as an element (like disutility) governing factor supply. We are then free to recognize that every factor bears risk in some degree.

There follows a spirited attack on marginal productivity theory. The reader should be warned that this is based largely upon a proposition which is false. Professor Keirstead argues that when all factors are paid the value of their marginal product the exhaustion of the product demands a "linear" production function; (linear in context presumably meaning homogeneous of order one). This is not true. Revenue is always just exhausted when price equals marginal cost equals average cost whatever the form of production function.

In part II of the book Professor Keirstead turns to more general problems of growth. He begins with an analysis of the characteristics of societies which do not grow, suggesting tentatively that an initial shock is required. Such a shock may be administered by contact with more progressive regions or by the removal of repressive influences. The mediaeval Christian Church is forcefully characterized as a repressive influence, a point of view not, of course, shared by all historians. Five conditions for development are set out. These are, first, stimulus from other societies, second a food surplus, third a strong political authority, fourth social flexibility, and fifth a suitable climatic environment. The argument is illustrated by numerous historical references with special emphasis on the experiences of Newfoundland and Japan.

The final chapters stand a little apart, being concerned with employment theory and the trade cycle. The phenomenon of simultaneously rising prices and rising unemployment in Canada is accounted for by inter-sectoral rigidities. The notion of the accelerator is attacked.

The wide range of topics mentioned in this review should not encourage the intending reader to suppose that Professor Keirstead has succeeded in condensing a new "principles of economics" into 180 pages. The book clearly has no other purpose than the pursuit of a number of particular points upon which the author feels strongly.

I. F. Pearce

Australian National University.

British Monetary Experiments, 1650-1710. By J. K. Horsefield. (London School of Economics, G. Bell & Sons, London, 1960.) Pp. xix + 344. 45/- stg.

Mr. Horsefield's subject is both wider and narrower than his title suggests. His main concern is with England, with limited refer-

ence to Scotland. The first forty and last ten years of his nominal period are respectively background and aftermath of his primary interest, the 1690's. But this was an extraordinarily rich decade for the monetary historian. It saw the foundation of the Bank of England and the Bank of Scotland; the great recoinage; the introduction of the Exchequer Bill; many plans for Lombard banks (the author prefers the old variant Lumbards); more than sixty schemes for capitalizing government revenue, of which the Bank of England was the permanent survivor of the three which passed into practice; a multitude of land bank schemes. There was a great outpouring of pamphlets and broadsheets—the author's bibliography lists 689 contemporary items, most of them from the 1690's.

On the other hand, "experiments" suggests a narrower treatment than the book reveals. Mr. Horsefield gives us clear summaries of various schemes, and traces, with careful documentation, the history of projects which got beyond the planning stage, although quite rightly he refrains from going over well-ploughed ground. Even so, his brief section on the Bank of England, for instance, adds to our knowledge of its early operations. His real interest, however, is in explaining why these "experiments" were advocated, and occasionally tried, and his answer lies mainly in the economic conditions of the time, and to a lesser extent in ideology. The impression left is that he regards the notions of the pamphleteers and projectors more as conditioned by recent events than as an independent force, except in the negative sense that the thinking of the period was severely limited both by scanty knowledge of the facts and by primitive theoretical equipment.

Yet consistently enough, ideas bulk large in the book—how they originated, what form they took, how acceptable they proved, and how valid they were. The result is a rich tapestry, in which events and ideas are interwoven, and, especially, it is made plain that the great apparent diversity both of events and ideas is part of a recognizable pattern. If one may venture a doubt, it arises from the way the author has given the bad state of British silver currency a dominant role in stimulating the host of projects. That it was extremely important is certain, but has Mr. Horsefield made out his case for such dominance? Such questions are, however, secondary. This is a book that will be indispensable for economic historians and historians of economic ideas alike, uniting as it does meticulous scholarship with easy exposition.

Printer and publisher deserve a word of praise. The book involves complex, and expensive, typesetting. Nevertheless, the printer has produced a clear and attractively printed page, even in those cases where a single page contains a wide range of types of material, and, for a book of this size and printing cost, the price is not unreasonable. The binding, however, is rather weak. Misprints are few and corrections usually obvious. It may be noted that the mysterious column

heading "age no." in the table on page 263 should be "Page no."; advance copies (only?) had, page 143, l. 6, 110% instead of 100%, and the publishers' correction notice unhappily referred to page 43.

S. J. BUTLIN

University of Sydney.

Commercial Crisis and Change in England, 1600-1642. By B. E. SUPPLE. (Cambridge University Press, 1959.) Pp. xii + 296. 42/- stg.

"The cloth trade is . . . the axis of the commonwealth, whereon all other trades . . . do seem to turn and have their revolution." This statement made in 1623 could well be the text of Dr. Supple's book in which he examines the fluctuations in the export of woollen cloth between 1600 and 1642 and attempts to analyze the longer term changes taking place in the English economy.

Apart from the years 1604-14, the export trade was in a state of chronic depression or stagnation. In 1614 exports stood at their highest point in the early seventeenth century. Then came the blunder of the Cockayne project which reduced the volume of exports; scarcely had recovery begun when trade plunged deep into the depression of 1620-4. The immediate cause of the depression were the currency disturbances in eastern Europe that had the effect of raising English export prices in European markets; but the growth of foreign competition was also undermining England's traditional export trade. Recovery from the depression was cut short in 1625 by an outbreak of plague—which dislocated commercial activity in London—and during the next fifteen years wars, commercial and monetary difficulties, foreign competition, and, finally, the threat of civil war, combined to keep the level of cloth exports low.

The account of the short-term fluctuations is very good. Dr. Supple has drawn heavily on the work of Professor Fisher and others but he has re-examined the evidence and has illustrated his arguments with apt quotations from contemporary sources and with an excellent statistical appendix. In addition he has related the so-called "mercantilist" writings on trade and monetary problems, and the economic policy pursued by the Crown to the actual economic conditions of the time. In doing so, Dr. Supple has aimed a well-directed blow against the idea of "mercantilism" which generally adds more darkness than light to the study of economic policy in the sixteenth and seventeenth centuries.

The section of the book dealing with long-term changes is less satisfactory. In the introduction the author tells us that total exports of textiles (including old and new draperies) possibly increased in the period 1600-42, but the development of the manufacture and export of new draperies receives scant treatment. Nothing is said, either, about possible expansion in the domestic demand for woollen cloth that might have mitigated the fall in overseas demand. Also,

there is no real attempt to trace the effects of the decline in cloth exports on the economy as a whole. Dr. Supple relies heavily on the fact that the manufacture of cloth was concentrated in certain regions of the country and that those areas suffered considerable unemployment in times of depression. But did the economy depend so much on the export of woollen cloth that stagnation and depression in the cloth trade affected the whole economy? Although this question would be very difficult to answer with certainty, it is perhaps wrong to see the English economy dominated by cloth in the early seventeenth century.

L. A. CLARKSON

University of Melbourne.

The Commonwealth Economy in South-East Asia. By T. H. SILCOCK. (Cambridge University Press, London, 1959.) Pp. xvii + 259. 30/- stg.

Professor Silcock's five lectures at Duke University seem to have been designed with several purposes in mind. The first three lectures, for example, are directed towards informing an American audience of the historical and political background to South-East Asia's economic problems—more especially the problems of Malaya, Singapore and British Borneo, for the Indonesian Republic and other non-British areas are somewhat cursorily described. Professor Silcock emphasizes his theme that each territory is unique in structure and purpose, that some of them suffer from an excess rather than a deficiency of enterprise, and that there are three or four things Americans could do to help along the economic development of these newly emerging nations. One of his suggestions is that America should not oppose (within G.A.T.T. or any other international body) the extension of "one-sided liberalization of trade" by the United Kingdom to these areas, if, indeed, such extension is proposed within a new Free Trade area. His fourth lecture, on Malaya and the European Free Trade Area, treats this particular topic in more detail. He points out the harm that may be done indirectly to Malaya's exports of primary products by the European Common Market's cultivation of higher cost producers in their own colonial territories, and argues that this makes the open British market of even greater significance to many South-East Asian exporters.

Finally, Professor Silcock reflects upon "The Determinants of Economic Development", in a lecture which puts well, among other points, some of the reasons why underdeveloped countries should maintain a high level of taxation, carefully designed "to encourage reinvestment of profits, particularly by small firms". While Professor Silcock does not attempt any theoretical originality, or to reach any definitive conclusions on such matters as the economist's treatment of moral judgments, his concluding lecture summarizes well many doubts and difficulties. Close observers of actual examples of economic

development, when they speculate upon the likely consequences of bringing such institutions as a price system or a democratic government to work within the framework of a partially pre-industrial society, especially one of little homogeneity, cannot but record misgivings as well as hope.

I. BOWEN

The University of Western Australia.

An International Trade in Managerial Skills. By J. S. FFORDE. (Basil Blackwell, Oxford, 1957.) Pp. viii + 153. 18/6 stg.

What Mr. Fforde says, in effect, is as follows: if underdeveloped countries are to develop they must acquire modern managerial skills (however defined—Mr. Fforde deliberately employs broad rather than narrow descriptive definitions). How *should* these skills be transmitted from country to country? Let us adopt the hypothesis that the best method of such diffusion would be one which gave the receiving country the widest possible access to the existing skills available, and the greatest choice. This would be through some kind of free market for managerial skills, without any monopoly on the supply side. Mr. Fforde then proceeds to examine existing institutions through which skills are in fact transmitted, and to judge them by his norm—his hypothetical "best" method, or free market.

It follows from the nature of Mr. Fforde's theme that an important point is that there shall be "localization" of management in the branches or agencies established by the British in overseas territories just as fast at it can efficiently be managed. (Mr. Fforde's study is confined almost exclusively to British enterprise, and the area he covered personally, by travel, included India, Pakistan, Burma and Indonesia.) He argues that the exporter of skills need not withdraw; the country with such skills to export should always be looking for new avenues of trade. As firms get localized, if a friendly atmosphere has been maintained, the attitude of the importing country should not be "when are these fellows going to leave?" but "what more can we buy from them, or use them for?" Mr. Fforde does not underrate the difficulties caused by rigid attitudes on both sides—over-sensitive nationalism, for instance, or the utter conviction of some of the "old hands" that the local population is feckless, lazy, dishonest and irresponsible. The trouble is, as he points out, that often both extreme points of view are justified towards *some* people of the other group. Pre-industrial societies have many people who appear feckless and lazy by industrial standards. But if they are to change, or if they have already changed, their ways, as fortunately some individuals have, they must be given training and responsibility. No branch office whose top management does not believe this ought to try to implement the policy.

Mr. Fforde's book is interesting and original. It is written with so much discretion as to blur the interest of the reader here and there, but there are enlivening imaginary episodes—no doubt founded on

fact—such as the account of the unfortunate manager who relied for part of his salary on a share in the profits of X's business, but forgot to have profits defined. The difficulties of industrialists buying managerial skill from other countries are very thoroughly sifted, and the relative merits of such methods as the trading houses in the east, or the merchant houses in Latin America, are given a more realistic treatment than can easily be found elsewhere.

Mr. Fforde's book should be compulsory reading by all Ministers of Development or Trade, and when Prime Ministers talk of technical aid to underdeveloped countries it would be as well if they had these problems in mind. For the economics student, this brief study is a useful contribution to an understanding of what development entails.

I. BOWEN

The University of Western Australia.

Readings in the Economics of Taxation. Edited by R. A. MUSGRAVE and C. S. SHOUP, American Economic Association. (George Allen & Unwin Ltd., London, 1959.) Pp. ix + 581. 36/- stg.

This is the eighth volume of *Readings* edited for the American Economic Association. It contains 32 reprints of articles more than five years old and a bibliography. The articles are classified into the two broad groups of Equity and Welfare and Incidence and Incentive Effects.

As might be expected from the topic, there is a sense of unity and consistency in the selections which perhaps makes them a more comprehensive cover than was possible in some of the earlier volumes. But one must deplore that all the articles except two were originally written in English because, as the editors say, "resources were not available for extensive translating". It would seem hardly worthwhile compiling a volume of this nature if such a parochial and penny-saving attitude is to be adopted.

Of the two non-English articles, one is a two-page gem by Wicksell on *Taxation in the Monopoly Case*, and the other is Enrico Barones path-breaking *Fundamental Theorems on the Mathematical Theory of Taxation.* The separate French, German, Italian and Scandinavian bibliographies, though brief, are stimulating.

The range of the articles is also somewhat narrower than one had hoped. Thus there is no section on the use of taxation to achieve those specific economic effects which, these days, are only too often attempted by direct controls and government prohibitions and embargoes. It would have been good, too, to see more on disguised taxation combined with subsidies such as the grant of monopolies and "home-price" schemes. But I suspect that the literature on these matters is all too scant. A purely Australian criticism is that the only reference in the bibliography to Giblin's theory of the measurement of relative severity of taxation is the 1933 *Economic Record* article which concentrated on the figures rather than the theory.

Let me conclude with an apology. In a work of this nature, a reviewer automatically sees and refers to the defects rather than the virtues. This compilation is in fact nearly all virtue, and there is little of it which should not be compulsory reading for all students of economics and taxation and treasury officials.

H. P. Brown

Australian National University.

International Economic Papers, No. 9. Edited by Alan T. Peacock *et al.* (Macmillan, London, 1959.) Pp. 248. 21/- stg.

"Two Discourses on Progressive Taxation" by the early sixteenth century Florentine, Francesco Guicciardini, the first article in this ninth number, is an excellent example of the value of this journal's policy of printing translations of significant earlier writings.

Guicciardini raised most of the major arguments for and against progressive taxation. He anticipated the Pigouvian principle that minimum aggregate loss of utility indicates a tax upon the richest at a marginal rate of 100%, and he understood the concept of equal sacrifice of utility—"equality in taxation . . . means . . . that the payments be such that they be equally onerous for all". He uses the "demonstration effect"—"they [the rich] do harm to all by their example because a citizen of the same city as well born as they comes to be ashamed of not being able to equal their train of life"; and the fact that wants are expansible but not contractible with income, as arguments in favour of progressive taxation.

In his second discourse against progressive taxation he discusses the disincentive effects of taxation, and uses the argument that the utility function is not independent of income so that the assumption of declining marginal utility of income is of uncertain validity.

Four centuries after Guicciardini we are making much the same points without his earthy commonsense, and in a jargon which has none of the elegance of his style.

"The Market Economy and Roman Catholic Thought" by the French Catholic economist Daniel Villey is likewise a change from the specialist articles of most of our journals. Villey argues that the rejection of economic liberalism by the bulk of Catholic thinkers has no theological basis. He gives lengthy argument for the view that "a Christian, *qua* Christian, has no preconceived views on economic or political problems", but suggests that the "game-like" nature of competition is an attribute which should commend it to Christians. He asks, "Should not economic life, following the example of religious life, also be an adventure, a contest, a game?" and answers himself with "to think of one's economic activity as a game . . . is to turn it into an image of the life of the spirit and a preparation for it". His argument justifying income inequality—"If loving one's neighbour like oneself is to mean loving him greatly then one must first love oneself. Charity must not be confused with masochism"—is original but no more convincing to this reviewer than his theory of games.

The article by the Italian, Siro Lombardini, dealing with investment criteria in underdeveloped countries examines the social marginal productivity criteria (see A. Kahn and B. Chenery in Q.J.E. February, 1951 and 1953 respectively), and concludes that while the correct principle it is measurable only when considering marginal investment in one sector. As an alternative approach he offers an outline of a linear programming model, but stresses both the technical problems of this approach and that "nothing can be done without a political purpose strong enough to refashion traditional habits . . ."

An article by Frisch on Paretian welfare theory has been included by the editors "as a mathematical tour de force and as an exercise in the interpretation of Pareto's work", but lack of technical ability prevented the reviewer from making the tour. There are also articles by W. G. Hoffmann on forecasting productivity changes, and a translation of a chapter dealing with the motives for holding cash from Karl Schlesinger's "Theorie der Geld- und Kreditwirtschaft" published in 1914.

Finally there is a most welcome innovation in the thirteen reviews by Scandinavian economists of recent publications by their colleagues. The reviews are long enough for the reviewer to give a useful critical as assessment of the argument and they are an excellent device for giving non-Scandinavians an idea of the work being done by Scandinavian economists.

R. WALLACE

University of Adelaide.

The Measurement of National Wealth (Wealth and Income Series VIII). Edited by R. GOLDSMITH and C. SAUNDERS. (Bowes, London, 1959.) Pp. xiv + 389. 45/- stg.

This book, which is published by the International Association for Research in Income and Wealth, maintains the high standard of previous volumes in the Income and Wealth Series. It consists of twelve papers presented at the 1957 Conference of the Association, plus an introduction by the Editors and a statistical survey by Th. van der Weide of national wealth estimates for eighteen countries.

Of the twelve Conference papers two are theoretical studies, one concerned with alternative methods of measuring capital (T. Barna) and one with problems of incorporating financial flows and balance sheet information in the national accounting system (P. J. Bjerve and M. Selsjord). The other ten papers consist mainly of estimates of the national wealth of different countries or regions (Norway, by O. Aukrust and J. Bjerke; the Netherlands, by the Netherlands Central Bureau of Statistics; the Federal German Republic, by F. Grünig; Yugoslavia, by I. Vinski; Canada, by A. Scott; Latin America, by A. Ganz; Argentina, by M. Balboa and A. Fracchia; South Africa, by D. Franzsen and J. J. Willers; Australia, by J. M. Garland and R. W. Goldsmith; and India, by M. Mukherjee and N. S. R. Sastry). These ten papers are generally concerned more with prob-

lems of collecting and adapting data than with conceptual or valuation problems, but several papers discuss the uses to which wealth estimates can be put with special reference to problems of economic growth. The Latin American paper is particularly interesting in this regard because it contrasts the experience of Argentina, whose relatively advanced economy has tended to stagnate during the post-war period, with Colombia, which has broken through the growth barrier with an increase in per capita product averaging some 2% p.a. since 1925.

Most of the papers on national wealth include calculations of capital-output ratios. In contrast with earlier studies the figures over time for a number of Western and Latin American countries provide evidence of a secular decline in the average (and by inference in the marginal) ratio of net capital to net output. It is difficult to interpret these results since a falling ratio can reflect such factors as increased utilization of capital, changes in the capital structure, ageing of capital resulting in lower net asset values, changes in the gestation period of investment, and changes in the terms of trade affecting net product, as well as increased productivity of capital resulting from greater efficiency. The Norwegian study (by Aukrust and Bjerke) underlines the difficulty of making generalizations about capital-output ratios. In Norway the capital-output ratio has been rising since 1948 and Aukrust and Bjerke suggest that in advanced economies the role of capital as a production-increasing factor is smaller than is generally assumed.

From a social accounting point of view the book, because of its pre-occupation with estimates of wealth in general and reproducible wealth in particular is of somewhat limited usefulness. Only two papers, the theoretical paper by Bjerve and Selsjord and the Netherlands study, discuss the problem of integrating balance sheet data into the social accounting framework, and no attempt is made to build up national or sector balance sheets.

In estimating the value of fixed assets in various countries both the perpetual inventory method (which involves the accumulation of investment expenditures, adjusted for depreciation and price changes) and direct estimates (based for example on census data) have been employed. Perhaps the main disadvantage of the perpetual inventory method is the difficulty of estimating the length of life of different classes of assets, and where this method is used there is a tendency to lump together different kinds of assets and apply a depreciation rate on the basis of an assumed average life for all assets in the group. The Garland-Goldsmith estimates for Australia, for example, assume a working life of 20 years for all producer durables and 40 years for all public works. In his paper Barna suggests that direct estimates of fixed asset values can be obtained from fire insurance statistics, but he seems to under-estimate the difficulties that result from under- or over-insurance and from the existence of different types of insurance policies, involving for example reinstatement of assets in a

new state in some cases and merely indemnifying on the basis of written-down values in others. The perpetual inventory procedure has the advantage of linking the wealth estimates with the national income accounts, and given a sufficiently detailed classification of investment, depreciation and price changes it should provide figures that are not too wide of the mark.

Garland and Goldsmith, in their interesting paper on the national wealth of Australia, could have improved their estimates of fixed asset values by making use of corporate tax data published in the Tax Commissioner's *Annual Reports* (which reflect detailed estimates of length of life of different classes of assets) and using a variation of the perpetual inventory technique described in *Inflation and Company Finance* (Mathews and Grant: Law Book Co., 1958), Chapter VI. One may quarrel also with some of their other assumptions and techniques, especially: (*a*) their arbitrary choice of reducing-balance and straight-line depreciation assumptions and their inconsistency in postulating residual scrap values only when the former method is used; and (*b*) their use of balance sheet data, derived from the Commonwealth Statistician's *Quarterly Business Surveys,* in estimating the value of non-farm inventories. Because Australian companies almost invariably understate stock figures in their published reports it would have been safer to use income tax statistics (as published in the Tax Commissioner's *Reports*) for the corporate sector.

Despite these limitations there is good reason to be grateful to Garland and Goldsmith for their pioneering efforts, and it is to be hoped that their study will soon be followed by official estimates. The Australian national income and balance of payments statistics urgently need to be supplemented by other kinds of social accounting information, in particular by flow-of-funds accounts and national balance sheets.

RUSSELL MATHEWS

The University of Adelaide.

BOOKS RECEIVED*

A.—AUSTRALIAN AND NEW ZEALAND PUBLICATIONS

COMMONWEALTH IMMIGRATION ADVISORY COUNCIL. *The Progress and Assimilation of Migrant Children in Australia.* Presented to Australian Citizenship Convention. (Canberra, 1960.) Pp. 43.

This booklet represents the first report of a Special Committee of the Commonwealth Immigration Advisory Council presided over by Mr. Justice Dovey. It contains a fairly extensive analysis of data obtained from a sample of 925 teachers from State and other schools throughout Australia. In addition, results of interviews with various private and public organizations such as employers' and trade associations, cultural, social and sports clubs and police authorities are also presented, although in a much less detailed manner. The committee found that 97 per cent. of all migrant children are not detrimentally affected by their background and that migrant children tend to show a better scholastic achievement than the Australian-born children but lag behind in leadership and social activities.

DAVIDSON, F. G. *The Industrialization of Australia,* 2nd ed. (Melbourne University Press, 1960.) Pp. 27. 5/6 Aust.

GOLLAN, ROBIN. *Radical and Working Class Politics : A Study of Eastern Australia 1850-1910.* (Melbourne University Press in association with the Australian National University, Melbourne, 1960.) Pp. 226. 35/- Aust.

MELLOR, D. P. *The Role of Science and Industry.* (Angus & Robertson, Canberra, 1958.) Pp. 738. 30/-.

It is Professor Mellor's task in this volume of the Australian War Histories to tell us how Australian science and industry responded to the challenge of the Second World War. An important contribution to Australian technological history in which the author has demonstrated both his historical and literary qualities.

B.—OTHER PUBLICATIONS

ALLEN, R. G. D. *Mathematical Economics,* 2nd ed. (Macmillan, London, 1959.) Pp. 812. 90/9 Aust.

The first edition of this work was reviewed in *The Economic Record* of December 1957. In this second edition, Professor Allen has corrected errors and misprints, made numerous revisions in wording and exposition, included further references mainly to books and articles published since 1956, completely rewritten some sections (*e.g.* on general economic equilibrium and on the dual problem in linear programming), and re-cast parts of the chapters on vectors and matrices. Finally he has added a completely new Appendix on "modern algebra"—the algebra of sets, groups and vector spaces.

ARTLE, ROLAND. *Studies in the Structure of the Stockholm Economy.* (FFI Report No. 57, Stockholm, 1959.) Pp. 207. 20 Sw. kr.

This report uses input-output techniques to describe the Stockholm economy in 1950. More than one-third of the text is concerned with basic concepts and problems of classification and arrangement of data. A further chapter presents some findings of the analysis; *e.g.* distribution of wages and salaries and gross factor returns; balance of current payments for Stockholm; direct and indirect gross factor returns per unit of output in the various sectors, and so on. The use of the study as a basis for forecasts is also discussed, and an indication given of further research on locational problems.

ASHTON, T. S. *Economic Fluctuations in England 1700-1800.* (Oxford University Press, Melbourne, 1959.) Pp. 199. 39/3 Aust.

BEVERIDGE, JANET. *An Epic of Clare Market.* (G. Bell & Sons, London, 1960.) Pp. 98. 15/- stg.

BEVERIDGE, LORD. *The London School of Economics and Its Problems 1919-1937.* (George Allen & Unwin, London, 1960.) Pp. 138. 21/- stg.

These books are intended to be read consecutively as an outline of the School's development from the manoeuvres which preceded its foundation in 1895 until the end of Beveridge's term as Director in 1937.

*Acknowledgment of publications does not guarantee review.

Both writers can develop only a few themes of their respective periods. Lady Beveridge's book describes in some detail the opposition which the Webbs encountered in nurturing the *enfant terrible*. With consummate skill they steered a hazardous passage between the insistence of Fabians like Bernard Shaw that the L.S.E. must preach socialist dogma, the anti-academic sentiments of Labour men like Ramsay MacDonald, and the antipathy of political and academic conservatives to an institution of such dubious origins. Their supporters—men of diverse political creeds—shared with the Webbs their concern at the deplorable condition of the social sciences as an academic pursuit in Britain.

Lord Beveridge outlines the change in the student body during his period from being a predominantly part-time body to being predominantly full-time. Among the other themes discussed in his book are the problem of staff participation in politics; the evolution of machinery for academic self-government; and the extension of the School's teaching to subjects which are on the fringe of the social sciences. The final chapter is an assessment of the Webbs.

BRAHMANANDA, P. R. *Studies in the Economics of Welfare Maximisation.* (University of Bombay, Economics Series No. 8, 1959.) Pp. 519.

This 500-odd page work is the result of seven years' work as a Ph.D. student at Bombay. Part I examines the classical approach stressing the broad politico-philosophical characteristics of this stage of development of the welfare idea. Part II deals with the Marshall contribution in detail and on a more analytical plane. Here again there are strong overtures on such subjects as equality and equity. All this is what one expects of an examination of how welfare theory developed. But Part III is disappointing: it consists of a rather dated, and eclectic, account of welfare theory in terms of the doctrine of increasing returns with only one small chapter on the applications of welfare economics in terms of the marginal cost rule. Thus, the development of welfare theory is scarcely taken beyond Marshall. And the modern students of the subject—raised on the tightly reasoned and economical analyses of Samuelson, Scitovsky, Lerner, Little, Reder, etc.—would experience some difficulty in relating this book to his studies.

DUPRIEZ, LÉON H. *Philosophie des Conjonctures Economiques.* (E. Nauwelaerts, Louvain-Béatrice Nauwelaerts, Paris, 1959.) Pp. 506. 425 fr. belges.

This work on economic conjunctures, that is, adjustments to impulses of any operational time by appropriate responses, is largely based on an earlier work of the same author (1947). It is mainly methodological, founded on realism as against idealism, on monism as against dichotomy of monetary and "real" economic explanations. Its realism is a teleological theory of human action with a tendency towards attaining equilibrium, built on marginalism and L. Walras's doctrine of mutual interdependence. The book is divided into three parts: On Principles, Conjunctures of the longest period (secular and Kondratioff), Conjunctures of the shortest period.

ERICKSON, CHARLOTTE. *British Industrialists Steel and Hosiery 1850-1950.* (The National Institute of Economic and Social Research, Economic and Social Studies XVIII.) (Cambridge University Press, 1959.) Pp. 276. 40/- stg.

Painstakingly devised and interestingly presented, this is a study of a thousand business leaders in two industries which developed from technical innovations in the third quarter of the last century. Inter-industry and inter-generation comparisons of leadership and mobility patterns are set against the changing, and contrasting, structures of the industries, and are given wider perspective by reference to current problems of management recruitment. There are valuable chapters devoted to the innovators who introduced the Bessemer and open-hearth processes, and factory production of hosiery at the beginning of the period.

FAR EASTERN ECONOMIC REVIEW. *1960 Yearbook.* (Far Eastern Economic Review Ltd., Hong Kong, 1959.) Pp. 150. Hk. $6.

This first yearbook reviews the main political and economic events of 1959. After a regional review and a list of major events follow special articles on Private Foreign Investment in S.E. Asia, on Tourism in that area, on the Mekong and Asian Highway projects. Economic and political events are reviewed for each one of 21 countries from Pakistan to Mongolia; many tables

of trade and production statistics are given. Hong Kong industries are reviewed in 12 chapters with detailed statistics. Economic indicators are given for 11 countries. At the end of the publication is a handy currency-conversion table for 15 S.E. Asian currencies.

GARVY, GEORGE. *Deposit Velocity and its Significance.* (Federal Reserve Bank of New York, 1959.) Pp. 88. 60 cents.

This monograph is one of a valuable series on monetary policies, institutions and techniques published by the Federal Reserve Bank of New York. The author deals first with the definition and measurement of velocity, then examines historical variations in velocity in the United States, and concludes with some thoughts on probable changes in velocity in the future. A very useful publication.

GUTMAN, R. *Birth and Death Registration in Massachusetts 1639-1900.* (Milbank Memorial Fund, New York, 1959.) Pp. 115. $1.00.

HUGHES, J. R. T. *Fluctuations in Trade, Industry, and Finance : A Study of British Economic Development 1850-1860.* (Oxford University Press, Melbourne, 1960.) Pp. 344. 73/- Aust.

ISARD, W., SCHOOLER, E. W. and VIETORISZ, T. *Industrial Complex Analysis and Regional Development.* (The Technology Press, Cambridge, Mass.; John Wiley & Sons, New York, 1959.) Pp. 294. $8.75.

Using Puerto Rico as a case study, this book develops evaluation procedures for identifying desirable channels of industrial expansion on a regional basis. The alternative industrial complexes examined are those based on oil refining, petrochemicals, fertilizer and synthetic fibre production.

KAPOOR, I. M. *Indian Currency.* (Kitab Mahal, Allahabad, 1959.) Pp. 200. Rs. 6.00.

This book is intended as a college text. It has a set of questions at the end of each chapter, and an index. It is partly a history of the currency, and partly an account of the problems of the five-year plans.

KARLIN, S. *Mathematical Methods in Games Programming and Economics.* (Addison-Wesley, 1959.) Pp. 433 Vol. I, pp. 386 vol. II. $21.5.

This is a superb text book of the mathematics of decision making. Indeed, it is more than a text book since the author is himself an original contributor to the subject of no mean stature. Vol. I, Part 1, introduces the theory of games. Part II sets out most of what is known about the techniques of linear and non-linear programming including two chapters on both static and dynamic aspects of Leontief type economic models. Vol. II is entirely devoted to game theory where strategy spaces are infinite dimensional. Practice examples are given at the end of each chapter. The most important mathematical theorems appealed to are briefly treated in appendices.

LETICHE, J. M. *Balance of Payments and Economic Growth.* (Harper & Brothers, New York, 1959.) Pp. 378. $6.00.

The first part of this book consists of a discussion of theories of the international balancing process, both past and present. It ends with the formulation of a "more general and inclusive theory". The second part applies the theoretical analysis to certain issues of economic development, and is essentially historical. The four chapters in this part deal with the adjustment between industrial and primary producing countries, differential rates of productivity growth and international imbalance, and the effects of economic growth on the international balancing process in the case of Britain and the United States. There is a valuable bibliography covering 44 pages.

MAMORIA, C. B. *Population and Family Planning in India.* (Kitals Mahal, Allahabad, 1959.) Pp. 167. Rs. 3.75.

The first half of this book discusses the population situation, the necessity for, and the difficulties in the way of, controlling birth rates. The remainder, representing an advance in Indian demographic literature, is a handbook description of contraceptive methods, a guide to their relative reliability, and a check list of reputable manufacturers.

MEDLICOTT, W. N. *History of the Second World War : The Economic Blockade, Volume II.* (Her Majesty's Stationery Office, London, 1959.) Pp. 727. 50/- stg.

MILBANK MEMORIAL FUND. *Thirty Years Research in Human Fertility : Retrospect and Prospect.* (Milbank, New York, 1959.) Pp. 157. No. price stated.

The nine papers included in the 137 substantive pages of this book are arranged in three groups: Trends and Measures of Fertility; Fecundity and Contraception; Social and Psychological Factors Affecting Fertility. Old theories, such as the over-rated Net Reproduction Ratios, are examined; new theories and techniques are outlined, and applied in specific studies. A most valuable contribution.

PENROSE, E. T. *The Theory of the Growth of the Firm.* (Basil Blackwell, Oxford, 1959.) Pp. 272. 55/6 Aust.

PILLAI, G. K. *Origin and Development of Caste.* (Kitab Mahal, Allahabad, 1959.) Pp. 271. Rs. 5.00.

POLLARD, SIDNEY. *A History of Labour in Sheffield.* (Liverpool University Press, Liverpool, 1959.) Pp. 372. 35/- stg.

In a work of impressive scholarship, Dr. Pollard has related working conditions, labour organization and standards of living in the light and heavy steel trades in Sheffield between 1850 and 1939 with technological and economic changes and fluctuations. He has not only added to the understanding of social and economic growth, but succeded in his aim of illuminating the lives of the common people.

PRIBIĆEVIC, B. *The Shop Stewards' Movement and Workers' Control, 1910-1922.* (Basil Blackwell, 1959.) Pp. 176. 41/6 Aust.

The following reasons are given by the author for the growth of ideas concerning workers' management of plant in the British railway, coalmining and engineering industries (1910-22): (*a*) that trade union activity shifted from political to industrial action following the decline in real wages after 1900, (*b*) the impact of the war brought disillusionment with government control of these industries, (*c*) the propaganda efforts of Syndicalists and Guild Socialists.

ROSTOW, W. W. *The Stages of Economic Growth.* (Cambridge University Press, London, 1960.) Pp. 178. Cloth ed. 21/- stg. Paper ed. 12/6 stg.

SHOUP, CARL S. and OTHERS. *The Fiscal System of Venezuela.* (Johns Hopkins, Baltimore, 1959.) Pp. 491. $8.75.

This is the report of a Commission, including Professor Shoup as Director, Sir Donald MacDougall and Professor John Due, which was established in 1958 at the request of the Minister of Finance of Venezuela. The report is of interest not only because of the valuable information which it provides on the Venezuelan economy and its fiscal system, but also because of the quality of its evaluation of that system from the viewpoint of the theory of public finance.

STEWART, MICHAEL. *Modern Forms of Government.* (Allen & Unwin, London, 1959.) Pp. 284. 21/- stg.

An up-to-date and careful summary of the constitutions of Commonwealth countries (90 pp.), U.S.A., West Germany, France, Scandinavia, Italy and the U.S.S.R., with briefer treatment of legal systems and political forces and problems. There are also general chapters on federalism, the "communist approach", and the "pattern of the democracies". The five Australian pages are without errors.

TUCKER, G. S. L. *Progress and Profits in British Economic Thought 1650-1850.* (Cambridge University Press, London, 1960.) Pp. 205. 27/6 stg.

UNITED NATIONS (Department of Economic and Social Affairs). *Industrialization and Productivity Bulletin 2.* (New York, 1959.) Pp. 68. 70 cents.

VICKERS, DOUGLAS. *Studies in the Theory of Money, 1690-1776.* (Chilton, Philadelphia, 1959.) Pp. 313. $6.50.

The author has performed a useful service in giving us a well-documented account of the development of monetary analysis viewed in the wider context of problems of economic prosperity, employment and growth, in the century before the publication of *The Wealth of Nations.*

This book has a twofold purpose: "it seems to discover the relevance of the economic literature (of the period), and in particular its monetary analysis,

to the general problems of economic prosperity and development . . . and it examines the contributions of the more important works on monetary theory in terms of their own internal logic and unity".

WORLD AGRICULTURAL ECONOMICS AND RURAL SOCIOLOGY ABSTRACTS. Vol. 1, No. 1, April 1959. (North Holland Publishing Co., Amsterdam, 1959.) Pp. 107. Sub. rate: 90/- stg.

This is a very comprehensive set of abstracts, covering the fields of agricultural economics and rural sociology, including such topics as government policy to agriculture, land reform, farm management, farm labour, farm accounting, marketing, credit, etc., as well as a number of closely related subjects in sociology, geography and history.

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Reviews

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